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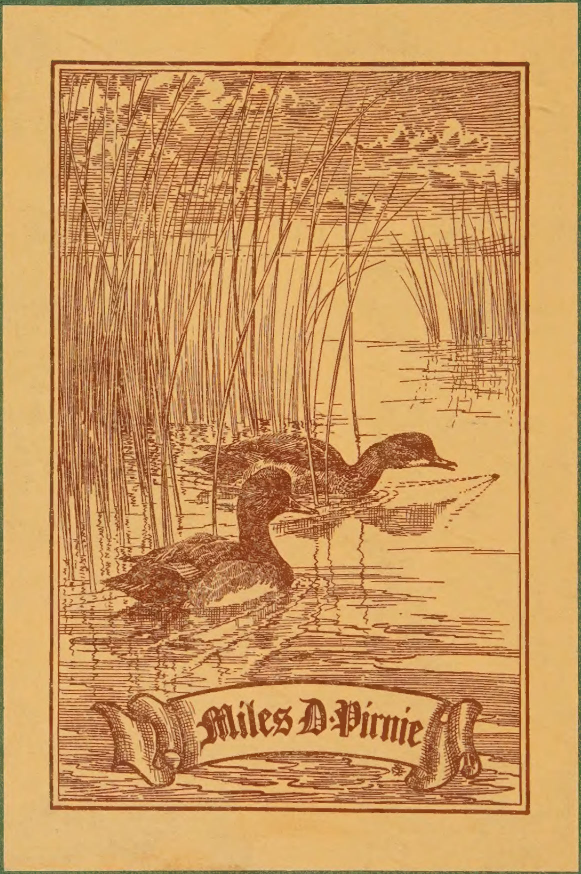

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THE COWBIRDS

A Study in the Biology of Social Parasitism

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THE COWBIRDS

A Study in the Biology of Social Parasitism

BY
HERBERT FRIEDMANN
AMHERST COLLEGE

1929
CHARLES C THOMAS · PUBLISHER
SPRINGFIELD, ILLINOIS BALTIMORE, MARYLAND

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INTRODUCTION

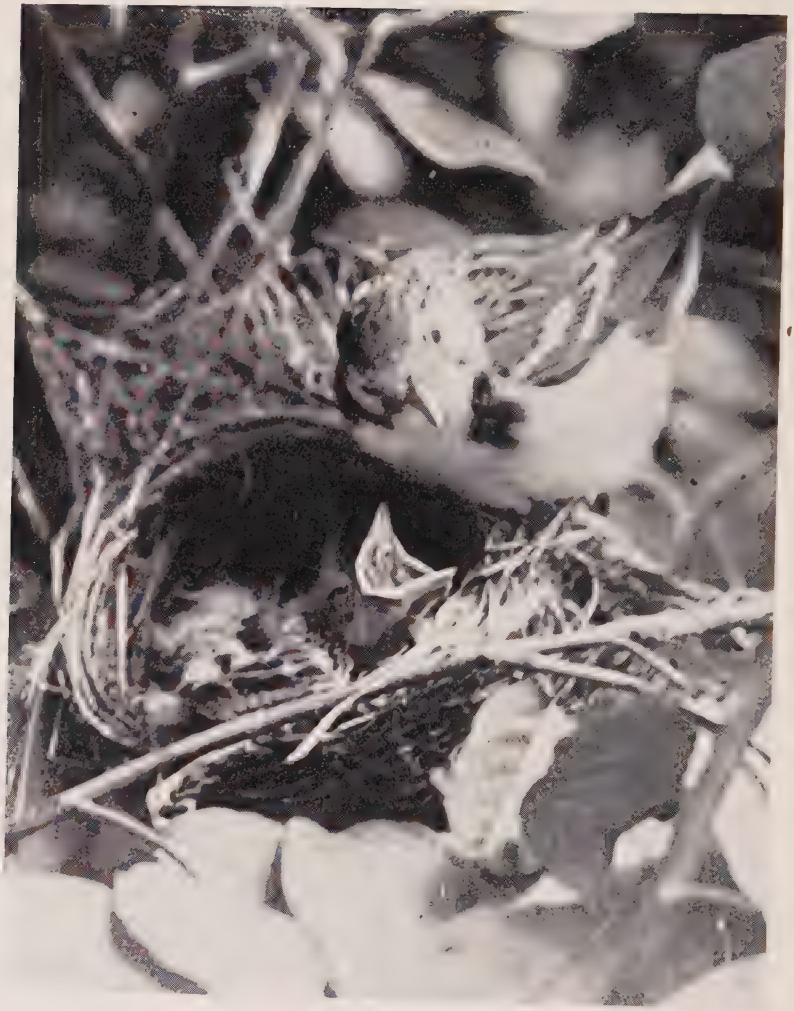
Among the many perplexing and fascinating problems in the study of birds few have aroused more interest for a greater length of time than the question of parasitism. Ornithology as a science dates back to Aristotle, and to this same outstanding figure of antiquity can we trace the first attempt to deal scientifically with the parasitic habits of the European Cuckoo. For over two thousand years since his time, and probably for a long period before him, people all the world over have wondered at this seeming exception to the laws governing the ways of bird life. A little over a century ago it was discovered that the Cuckoos were not the only birds that had parasitic breeding habits and that the Cowbirds also exhibited this remarkable mode of reproduction. Later still it was found that some of the African Honey-guides and Weaver-birds were also parasitic and just a few years ago a South American duck was found to be likewise parasitic. This widening of the subject naturally resulted in a corresponding increase of interest in it in various parts of the world. As might be expected a vast literature has grown up around this question; a literature none too reliable in many places and truly scientific and accurate in but few parts. Twenty-odd centuries of speculation tempered with as few facts as it is bolstered with as many fancies have produced a resulting mass that is far from satisfactory as a basis from which to work. By no means is all the literature of this sort; some very good work has been done, to be sure, but in the total bulk of published thought, the unreliable and the non-scientific so far exceeds the trustworthy that a survey of the literature of this subject is of more interest than profit to the ornithologist.

It is a well known truism that theorizing becomes increasingly difficult as the number of known facts becomes larger.

This is especially true in the case of parasitism, but unfortunately the number of known facts seems to be not yet sufficiently large to offer a serious obstacle to a large number of theorizers, while at the same time it is large enough to enable non-theorizers to pick to pieces the beautifully woven fabrics of their more imaginative colleagues. Consequently little is accomplished save that the existing chaos of opinions is made a little more chaotic. Amidst the present maze of conflicting statements, of intermingled facts and fancies, only one thing is really clear,—and that is that we do not know enough about the problem to offer a satisfactory explanation of it.

Baldamus, Rey, and, more recently, Chance, have spent much time and energy in elucidating many points in the economy of the European Cuckoo and have thereby rendered very valuable service to the study of parasitism. Baker and others have given us much information about a number of parasitic Cuckoos of India and the Malay region. Likewise Hudson did much towards our understanding the habits of the Cowbirds of Argentina. Alexander Wilson was the first to record the parasitic habits of the North American Cowbird, and in the century and a quarter that have elapsed since his time numberless observers have published notes on this bird. Many of these notes are of little real value since they are somewhat vitiated by the fact that their authors jumped to conclusions with no basis for so doing. The Cowbird has never been subjected to the same intensive study and close scrutiny that has been the lot of the European Cuckoo. A thorough knowledge of the natural history of the Cowbird is a matter of the utmost importance in the study of parasitism and our lack of positive data is doubtless due to difficulties in obtaining it. A prolonged intensive study in a limited region offers the only way to the desired formation. It was with hope of making some small contribution to our knowledge of this subject that just such a study was started and it was thought best to supplement these results with a *summary and compilation of all the pertinent literature, thus making the result at once both intensive and extensive in character. After three years work on the North American Cowbird an unexpected opportunity to extend the work to cover all the Cowbirds of both North and South America was offered and, needless to say, accepted. The present work is a complete report on all the Cowbirds, based on five years of uninterupted work; three breeding seasons were spent in central New York State, one in Argentina, and one on the Texan-Mexican border.*

Amherst, Massachusetts, *H. F.*
January 1, 1929.



Chestnut-sided Warbler (*Dendroica pensylvanica*) at Nest with Young Cowbird (*Molothrus ater ater*).

ACKNOWLEDGMENTS

This study of the Cowbirds was started at Cornell University and continued at that institution for three years (1920-1923). In July, 1923, the National Research Council undertook to support the work and continued to do so until the close of the field work in 1926. At Ithaca my work was greatly facilitated and aided by Doctor Arthur A. Allen, Professor of Ornithology at Cornell, and to him I take pleasure in expressing my thanks and indebtedness for many favors, much good advice and helpful criticism. Throughout the three years I spent there he was always ready to give me the benefit of his experience and to aid in the prosecution of of the work. Subsequently the National Research Council gave me a fellowship to continue my studies and to extend them to cover the South American species as well as North American forms. To the Board of Fellowships in the Biological Sciences of the National Research Council are due my thanks for the opportunity and financial support which has made this work possible.

In the course of my field work many kind friends helped in one way or another. Outstanding among these are Dr. Roberto Dabbene of the Museo Nacional in Buenos Aires who welcomed me in Argentina and gave freely of his advice and knowledge of that country; the officers of the Bovril Company at Santa Elena, Entre Rios, Argentina, who made me more than comfortable during a sojourn of nearly two months at that place and gave me every facility for the prosecution of my studies; and Mr. R. D. Camp of Brownsville, Texas, who greatly aided my work on the Mexican border.

Besides these, many observers have sent me data on Cowbirds in their respective regions, and to them I am indebted

for much valuable material. Among these the following are particularly worthy of mention:

Barrows, W. B., Lansing, Michigan (since deceased).
Bent, A. C., Taunton, Massachusetts.
Eastgate, A., Bottineau, North Dakota.
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Girard, P., Rio Colorado, Tucumán, Argentina.
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Mousley, W. H., Hatley, Quebec, Canada.
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Oberholser, H. C., Washington, District of Columbia.
Pemberton, J. R., Tulsa, Oklahoma.
Quillin, R., San Antonio, Texas.
Ridgway, R., Olney, Illinois.
Roberts, T. S., Minneapolis, Minnesota.
Smyth, C. H., Santa Elena, Entre Rios, Argentina.
Stansell, S. S. S., Edmonton, Alberta, Canada.
Stone, W., Philadelphia, Pennsylvania.
Wetmore, A., Washington, District of Columbia.

In the course of my museum studies of Cowbirds I was given the privilege of examining the material in the Museum of Comparative Zoölogy at Cambridge, the American Museum of Natural History at New York, the United States National Museum (including the collection of the Biological Survey) at Washington, the Museum of the Academy of Natural Sciences at Philadelphia, the Carnegie Museum at Pittsburgh, and the Field Museum at Chicago. My thanks are due especially to Mr. Outram Bangs and Mr. James L. Peters of the Museum of Comparative Zoölogy, Dr. Frank M. Chapman and Mr. Waldron DeW. Miller of the American Museum of Natural History, Dr. Charles W. Richmond of the United States National Museum, Dr. Harry C. Oberholser of the Biological Survey, Dr. Witmer Stone of the Academy of Natural Sciences of Philadelphia, Mr.

W. E. C. Todd of the Carnegie Museum, and Dr. Charles E. Hellmayr of the Field Museum for the permission to study the material under their care.

During the preparation of this and other manuscripts I have had the pleasure of working in the laboratory of Dr. William M. Wheeler, at the Bussey Institution, Harvard University, and to Dr. Wheeler I am indebted for many favors and for the use of the facilities of his laboratory.

The E. P. Dutton Company has granted permission to quote from the writings of the late W. H. Hudson.

Finally, in the matter of publication, I am indebted to the National Academy of Sciences for a grant which has made possible the printing of this work in its present form.

H. F.

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I

THE GENERA OF COWBIRDS

The Cowbirds form a natural group of the family Icteridæ or Hangnests. They are rather small terrestrial or semiterrestrial birds with the bill stout and shorter than the head; nostrils with a superior operculum; the middle phalanx of the middle toe shorter than the terminal phalanx; outer toe (without claw) reaching beyond the second (subterminal) joint of middle toe; nostrils small and round, much encroached upon by the feathers of the loral antiæ; all but one genus parasitic. The Cowbirds form a link between the Icteridæ and the Fringillidæ but belong in the former family although it is hard to draw a line between the two. The absence of obvious rictal bristles is the only external character that distinguishes the Icteridæ as a group from the Fringillidæ and the Cowbirds agree in this respect with the rest of the Icteridæ.

The Cowbirds belong to three genera—*Agelaioides, Molothrus* and *Tangavius.* The first genus, *Agelaioides,* contains the most primitive cowbirds and may be characterized as follows: non-parasitic Cowbirds with short, rounded wings (the wing tip shorter than the length of the exposed culmen); "female" type of coloration in both sexes; no courtship display; and the song utterance unlike the regular form common to all the other Cowbirds. Two species with three races.

The genus *Molothrus* contains the typical Cowbirds all of which have the same type of courtship display and song; long, pointed wings; dark plumaged males; and parasitic breeding habits. Three species and ten races. This genus contains two subgenera, as follows: *Strepitovagus* (*M. rufo-axillaris*), and *Molothrus* (*M. bonariensis* and *M. ater*). The first subgenus is characterized by black coloration in both sexes; wing tip at least twice as long as the exposed culmen; and the tail is longer and more rounded than in typical *Molothrus.* The second subgenus is characterized by sexual plumage dimorphism; shorter and less rounded tail than *Strepitovagus,* and the wing tip less than twice as long as the exposed culmen.

The genus *Tangavius* contains two species (*armenti* and *aeneus*) and may be characterized as follows: Cowbirds with the outer pairs of primaries incised on their inner webs; the feathers of the mantle in the males enlarged to form a distinct ruff or cape; and the plumage of the neck and breast somewhat hair-like.

Key to the Genera of Cowbirds

A. Outer primaries incised . . . . *Tangavius*
AA. Outer primaries not incised.
  B. Wing tip shorter than exposed culmen . . . . *Agelaioides*
  BB. Wing tip longer than exposed culmen . . . . *Molothrus*

GENUS AGELAIOIDES

Two species and three races

Non-parasitic Cowbirds with short, rounded wings, no sexual plumage dimorphism, and no courtship display.

KEY TO THE SPECIES

A. Primaries bright chestnut-brown, broadly tipped with fuscous ...... *A. badius*

AA. Primaries dull olive brown, narrowly edged with pale chestnut..... *A. fringillarius*

II

AGELAIOIDES BADIUS

The Bay-Winged Cowbird

Key to the Races of Agelaioides badius

A. Wing length averaging 100 mm. . . . . *A. b. bolivianus*

AA. Wing length averaging 90 mm. . . . . *A. b. badius*

Range

The Bay-winged Cowbird is found in Argentina, Uruguay, Paraguay, Brazil, and Bolivia, ranging high up in the mountains in the last named country, while more restricted to the lowlands eleswhere in its range: Time and environment have differentiated the species into two races, as follows:

a. *Agelaioides badius badius.* Bay-winged Cowbird.

The typical form of the Bay-winged Cowbird occurrs in the northern half of Argentina, throughout Uruguay, and north into southern Brazil and Paraguay. It has recently been introduced into Chile where it apparently seems to be establishing itself locally. In Argentina it is a bird of the open bushy districts and cultivated areas, even nesting at times in large gardens, but on the whole it is less commonly found around houses and cattle than is the Shiny Cowbird, *Molothrus bonariensis.*

In the Argentine Republic the Bay-wing has been recorded as far south as northern Patagonia, province of Rio Negro (Hudson). It occurs commonly in the following provinces: Pampa (Wetmore), Buenos Aires (many observers), Mendoza (Wetmore and others), Entre Rios (Holland, Friedmann, etc.), Santa Fe (Friedmann), Cordoba (Schulz and others), San Juan (several observers), La Rioja (Koslowsky), Santiago del Estero (Friedmann), Catamarca (Fontana), Tucumán (many observers), Corrientes (Doering), Chaco (Wetmore, Venturi, etc.), and Salta (Steinbach and others). There is some question as to the subspecific identity of the birds found in Salta as they may belong to the Bolivian form.

In Uruguay, Aplin found the Bay-wing very common, often coming into gardens. Wetmore met with this species at San Vincente, Lazcano and Rio Negro; Devincenzi found it breeding commonly near Montivideo, as have several others.

The extent of the range of the Bay-winged Cowbird in southern Brazil and Paraguay is very imperfectly known and its local status is likewise still to be learned. The only definite Brazilian records I know of are a male collected at Jaculy, Rio Grande do Sul, now in the collection of the Museum of Comparative Zoology, and von Ihering's records from Minas Geraes and Rio Grande do Sul. In Paraguay, Wetmore met with this bird only at Kilometer 110 west of Puerto Pinasco, and von Ihering also reported it from around Puerto Pinasco and vicinity.

As far as I have been able to discover nothing has been published about the status of this bird in Chile. In the collection of the Museum of Comparative Zoology there is a skin of an adult male collected in December, 1923, at Curico, Chile. On the original label the collector wrote "ave recien introducado en Chile." Apparently the species was introduced some years ago and became established in Corico and probably elsewhere as well. That it is still uncommon and very local is certain.

Type Locality—Paraguay

b. *Agelaioides badius bolivianus.* Bolivian Bay-winged Cowbird.

This race replaces the preceding form in the highlands of Bolivia. Hellmayr gives its range as comprising the Andes of North and Central Bolivia in the provinces of Yungas (Tilotilo), Sicasica, Cochabamba, Sucre (Chuquisaca), and Mizque (Valle Grande). The altitudinal range is not yet well known but Miller (1917) found the bird fairly common at 9000 feet.

Type Locality—Yungas, Bolivia

MIGRATION

The Bay-winged Cowbird is not migratory. In the winter the birds wander about in small flocks but never go more than a few miles. The species is in reality quite sedentary.

COURTSHIP AND MATING

This genus is unique among the Cowbirds in that it has no courtship display of any kind. Although they occur in small flocks all through the winter, the birds pair off regularly in the spring but do so without indulging in any displays. For this reason it is practically impossible to determine the limits of what would correspond to the courting season of other birds. As early as the beginning of November I saw pairs (determined by collecting) of these birds while small flocks were observed as late as the third week of December. However some of these late flocks may have been composed of unmated birds or year-old, non-breeding individuals, although all the birds shot from these groups had the gonads more or less enlarged. Then too, because of the similarity in plumage of the sexes, it is impossible

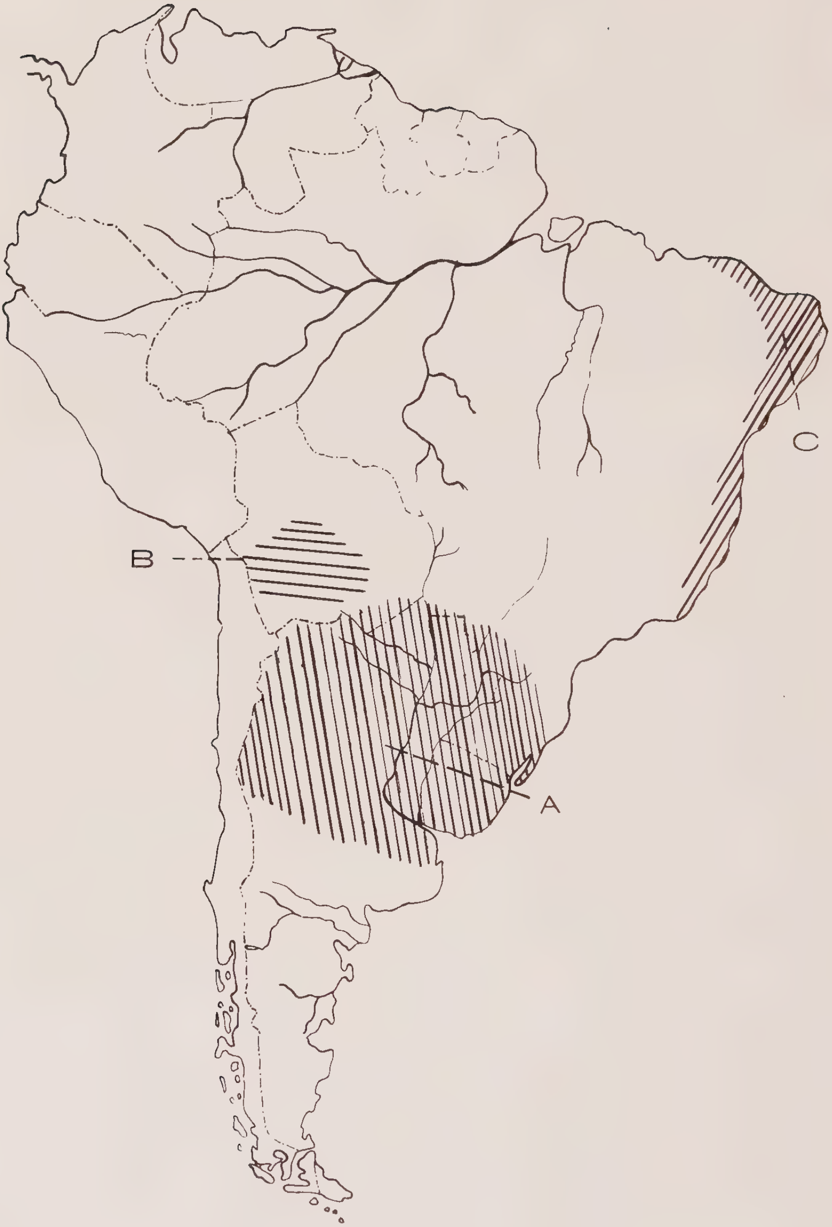


Fig. 1.

Geographic Distribution of Agelaioides

A.—Range of *Agelaioides badius badius.*
B.—Range of *Agelaioides badius bolivianus.*
C.—Range of *Agelaioides fringillarius.*

to determine, without collecting, whether any two birds seen together in spring are really a pair and not two males or two females. For these reasons it is very hard to define anything comparable to a courtship season for the Bay-winged Cowbird. The only thing that is noticeable in the field is that as the season wears on from early November to December the number of flocks become fewer, the flocks smaller, and the groups of twos commoner. Although I watched this species almost daily from the middle of September until the beginning of March I could never tell the sex of a bird by its actions except at the nest. From this it may be gathered that the male has none of the usual male habits—courtship, distinctive sexual song, "pointing", etc.

This part of the life history of the Bay-wing then has to deal only with the song and call notes.

Review of the Literature

Hudson (P. Z. S. 1870 pp. 671-673) writes of this bird,—"Its language is varied; and it has different notes to call its companions, to express alarm, and when about to fly or sing. When flying it utters frequently a peculiarly long, loud, and melodious note that may be heard half a mile off on still days. Its song is low, sweet and varied, and all the individuals of the flock sing together. . . ."

In another publication Hudson (P. L. Sclater and W. H. Hudson, Argentine Ornithology) writes,—" . . . . Their language is varied. Curiosity or alarm is expressed by trilling notes, and before quitting a tree all the birds of a flock ceremoniously invite each other to fly with long clear notes, powerful enough to be heard a quarter of a mile away."

"They also sing a great deal in all seasons, the song being composed of soft, clear, rather sweet notes, variously modulated, uttered in a leisurely manner, and seeming to express a composed frame of mind, all the birds of a flock singing in concert. During the cold season the flock always finds some sheltered sunny spot on the north side of a wood pile or hedge, where they spend several hours every day, sitting still and singing in their usual quiet, soft style."

Dalgleish (1881 pp. 245-246) writes that the song, ". . . . is low, sweet, and varied, all the flock singing together. When flying, they utter a loud and melodious note, which can be heard half a mile distant."

Song and Call Notes of the Bay-winged Cowbird

The Bay-wing has a song that probably must be recognized as its true song although it is not confined to the male. However, the males sing more frequently than the females. In addition to the song, this species has at least three types of call notes each of which is common to both sexes.

The song is very different from that of the other Cowbirds. It consists of a series of 4 or 5 thin, short, uninflected, pleasant notes given in a voice that more nearly expresses weariness than any other bird sound

I know. The birds seem to have no energy and chant monotonously as though they were doing it solely because they had nothing else to do. The song utterance is not nearly as loud as that of its congeners and lacks the glass-like clarity that characterizes the vocal efforts of the Shiny Cowbird and the North American species. Frequently the song is repeated over and over again without any prolonged pauses and usually when one bird in a flock starts singing the others begin but not in time with the first one. The noise produced by a flock of singing Bay-wings is quite pleasing in its dreamy, chanting fashion but yet rather insipid, formless and meaningless. Often a singing bird interrupts its song at almost any point with a few deep gutteral *chuck* notes.

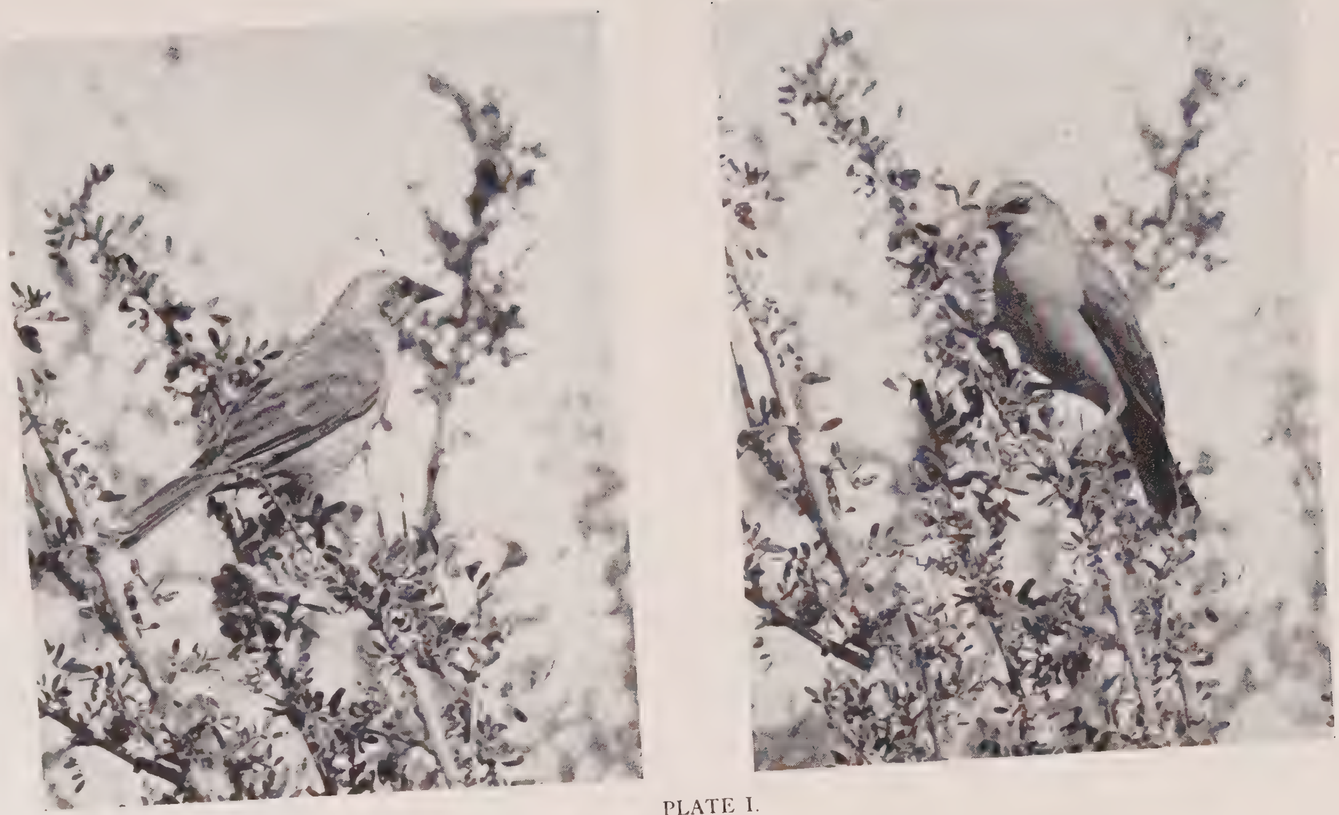
Once in Entre Rios (eastern Argentina) I heard a very unusual song from a Bay-winged Cowbird. It consisted of a series of seven thin, high, slightly beady notes—*whss te te whss te te whss,* the last one being inflected and more beady than the others. The quality of the tone was much like the sound produced by whistling with teeth together and the tongue curled against the upper teeth,—a slightly wheezy whistle.

While the birds are on the ground or in the air they never sing but use only their call notes. Without doubt most of the real singing is done by the male birds, but I have shot singing individuals and on dissection found them to be females. There seems to be no special song season, i.e. song is not confined to any particular time of the year but is given all through the winter as well as the breeding time. It is not indulged in during the time of postnuptial molt,—from late February until the middle of April.

In one pair that was watched daily at their nest, the male sang regularly and frequently until the first egg hatched, after which he stopped singing almost entirely and began to help feed the young.

The call notes are of at least three types.

The first and commonest form of call note is a very harsh, hoarse, guttural *chuck* much like the corresponding note of the Screaming Cowbird but a tiny bit lower and like that of a Red-winged Blackbird but very slightly higher. This is the usual feeding call and is also used as a call to other birds of its own kind and from one bird to its mate. In Entre Rios I watched a pair of Bay-wings very closely for a month and a half and found that whenever the female would return from the fields where it had been feeding, to the vicinity of the nest, it would go to a tree about 30 feet from the nest tree and give one of those *chuck* calls. The male on guard in the nest tree would reply in kind if all was well and then, and not until then, the female would fly over to the nest. If all was not well, the



Male.

Female.

PLATE I.
AGELAIOIDES BADIUS BADIUS.

male would fly either to the female or to another tree and then answer with a *chuck* note whereupon the female would fly over to him.

The second type of note is very similar to the first but is less commonly used; it is also a *chuck* note but less guttural, sharper, and higher in pitch. I cannot be absolutely sure of its meaning but it seems to be a danger alarm call and is used chiefly when driving off other birds from the nest or from food. However in many of the most spirited fights that I observed between Bay-wings and Woodhewers whose nests the former were trying to usurp, the Cowbirds were remarkably silent.

The third type of call note is a loud, clear prolonged whistle that may be written *peeeooh*. This corresponds to the flight whistle of the other Cowbirds but lacks any suggestion of the plaintiveness which is so characteristic of this call in the others and in some other birds such as Red-winged Blackbirds[1] and Yellow-shouldered Blackbirds.[2] This note is relatively seldom given and is used equally by both sexes.

SEXUAL RELATIONS

Review of the Literature

Hudson writes:—"Their extreme sociability affects their breeding habits, for sometimes the flock does not break up in spring, and several females lay in one nest together; but whether the birds are paired or practice a promiscuous intercourse, I have not been able to discover. . . . . One summer a flock of about 10 Bay-wings took possession of a *Leñatero's* nest . . . . and after a few days I took 14 eggs from it. . . . . As a rule, however, the flock breaks up into pairs. . . . ." In another paper (P. Z. S. 1870, p. 672) he says that, ". . . . It often happens that the flock does not break up in the spring and on such occasions they entertain a promiscuous sexual intercourse. Sometimes they pair. . . . ." Dalgleish (1881, pp. 245-6) says that, ". . . . the sexual attachment is not strong."

My experience with the Bay-wing Cowbird has been that it almost always pairs off in regular monogamous fashion. On only one occasion did I see anything suggestive of irregularity and in that case the evidence was far from complete. On January 13, 1924, on one of the large islands in the Paraná just opposite Santa Elena, I saw two Bay-wings go to an old Leñatero's nest. As I approached one flew away and I shot the other which I found to be a female. A minute later the other bird came back (at least I supposed it was the same individual that had flown away a minute before) and I shot it and found that it too was a female. Both had enlarged ovaries. I had to chop down the nest to examine it. It contained three Bay-wing eggs all broken by the fall, but as far as I could judge by the pieces all three were the product of the same bird. Whether both females had an interest in the nest I cannot say with any degree of certainty.

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[1] *Agelaius phoeniceus.*

[2] *Agelaius thilius.*

Señor Palbo Girard, an exceptionally well informed and thoroughly reliable resident naturalist of Tucumán informs me that of sixty-six nests of the Bay-winged Cowbird that he has examined not one contained eggs laid by more than one Bay-wing. Although there are several cases of nests, each containing eggs of several Bay-wings recorded by various writers from Hudson to Miller, it must be remembered that there is not much more difference between the eggs of the Bay-wing and those of the Screaming Cowbird than there is between eggs of different individuals of either species. This may account for some of the records but it is possible that others may be correct.

In the collection of Mr. Stewart Shipton of Concepción, Tucumán, I examined a nest containing eggs of at least two Bay-winged Cowbirds, and Leo Miller has recorded eggs of no less than five Bay-wings in one nest. So then it seems that irregularities occasionally do occur. The data on most of these cases are very meager but in only one instance is it definitely known that the eggs were at all incubated and in this case the eggs ranged from fresh to partly incubated and addled. In the other cases where any data was given as to the condition of the eggs, they were all fresh. It may be, then, that when several females do lay together, the eggs are not cared for by any of them, much after the fashion of the "superfluous nests" of certain waterfowl, such as the Canvasback, Red-head and Ruddy Ducks. In the one case in which some of the eggs were incubated, they may have been the first ones laid and the bird started to incubate but it gave up on account of the others laying in its nest.

Of polyandry there is no indication in the Bay-winged Cowbird.

Summary of Sexual Relations

1. The Bay-wing is monogamous but several observers have indicated that its sexual relations are not very strong.
2. Occasionally several females lay in one nest but the evidence is insufficient to warrant this being interpreted as polygamy.
3. There is absolutely no sign of polyandry or any inclination in that direction.

TERRITORIAL RELATIONS

The territorial question is much simpler in this species than in any of the other Cowbirds as each pair has its nest and is thereby tied down to a definite area. The size of the territory varies greatly according to the abundance of scarcity of old nests of Woodhewers in which to breed.

There are some points, however, about the breeding "territories" of this Cowbird that are quite remarkable.

In the case of practically all birds whose breeding habits are fairly well known, the male establishes a "territory" in which he allows no other male of his kind to settle. He usually has a definite "singing tree" from which he announces to all females within range the fact that he has established a breeding territory and wants a mate and at the same time warns other males not to come there. This is not the case with the Bay-winged Cowbird. I spent a great deal of time trying to see what actually happens and the best I can say is this:—When the flocks break up in spring they seem to break up in pairs and scatter in pairs. The birds, already paired, then look for suitable breeding places and when a suitable nest is found both the cowbirds fight with the builders for its possession. In other words, the establishment of a "territory" in this species is as much the work of the female as it is of the male. After a nest has been captured, or as sometimes happens, a nest has been built by the Bay-wings, some part of the tree in which the nest happens to be, becomes the favorite singing perch of the male. So then, not only does the female share in the establishment of the breeding territory but the choice of the "singing tree" follows, instead of precedes, the establishment of the nest.

The explanation for this is quite simple. In most birds the male establishes the territory and the female chooses the nest site. In the Bay-winged Cowbird the "territory" follows the occupation of a suitable nest and is built around it. This means that the nest site is chosen before the territory is established so that the participation of the female in the acquirement of the nest site is not at all contrary to the general rule displayed in other birds. As will be shown later, the defense of the nest is left largely to the male so the proximity of nest and "singing tree" is highly desirable and of real importance.

To put the whole thing in a nutshell, instead, as in most birds, of establishing a territory with a view as to its promise of food supply and then choosing a nesting site somewhere within its boundaries, the Bay-wings choose nest-sites and then extend their territories radially as far as necessary to assure a sufficiency of food.

This altered conception of the "territory" as exemplified by the Bay-wing manifests itself again in the defense of that territory. Instead of being the basic thing, the "territory" is secondary to the nest, and while the male Bay-wing and under certain conditions (see under Nests and Nest-building) the female also, vigorously defends the nest, the defense of the territory is often more theroretical than real. This is probably due to the abundance of food in relation to the number of Bay-wings to consume it. Its chief importance, however, is that it opens an easy path towards a possible polyandry in its more highly evolved congeners.

NESTS AND NEST-BUILDING

Review of the Literature

Hudson (1920, p. 114) writes that the Bay-wings, ". . . . have a great partiality for the large domed nests made by the *Anumbius acuticaudatus* called Leñatero in the vernacular. One summer a flock of about 10 Bay-wings took possession of a Leñatero's nest on one of my trees and after a few days I took 14 eggs from it. . . .

"As a rule, however, the flock breaks up into pairs, and then a neat, well-made nest is built in the fork of a branch, lined with horsehair; or, oftener still, a Leñatero's nest is seized, the Bay-wings fighting with great spirit to get possession, and in it, or on it, their own nest is made. Like their relations, the common Cowbird, they seem strongly attracted by domed nests, and yet shrink from laying in the dark interior. As a rule, when they have captured a Leñatero's nest they break a hole in the side and so admit the light and form easy entrance. One summer a pair of Bay-wings attacked a Leñatero's nest on one of my trees, the fighting was kept up for three of four days, and then at the foot of the tree I found 5 young Leñateros, fully fledged, which had been pecked to death and thrown out of the nest."

In another place the same author says that, ". . . . the Bay-winged *Molothrus* . . . . occasionally builds a neat, exposed nest; yet so great is the partiality it has acquired for large domed nests, that whenever it can possess itself of one by dint of fighting it will not build one for itself."

Leo Miller (1917, p. 581) writes of this bird: "Near Cochabamba, we found *M. badius* to be a very common bird; and while we were not fortunate enough to be in that vicinity during the nesting season, we were frequently told of the battles which take place between the Bay-wing and the Ovenbird (*Furnarius*) for the possession of the latter's nest. In these fights the Cowbird is said to be successful in the majority of instances, and often succeeds in killing his adversaries. The Museum of Natural History and the Museum connected with Veterinary College in Cochabamba, have on exhibition small groups of the mounted birds, illustrating this pugnacious trait of character; and the Bay-wing is always shown as victor, standing over the bloody body of the Ovenbird. This may, of course, be an exaggeration, but I nevertheless think there must be a good foundation for the belief."

Venturi (ex Hartert and Venturi, 1909, p. 185) says that at Ocampo he never found nests of *A. badius* built by the *badius* nor complements of 10 eggs but always 5 or 6. He also writes than in the spring when the nests of *Phacellodomus* and *Synallaxis* are occupied by their owners, the Bay-wings content themselves with excavating a cavity in the upper part of the nest and putting some twigs in it while later in the season, at what he refers to as the second brood, they lay their eggs in the nests of these species and others.

The Nest-Building Habits of the Bay-wing Cowbird

A treatment of the subject of nest-building in the Bay-winged Cowbird is to a considerable extent an account of the battles fought for the possession of nests built by other birds. As we have seen above several writers have noted the combats for nests between Bay-wings and the builders. However, it should not be imagined that all nests acquired by the Bay-wings are taken by force. Sometimes the birds use old abandoned nests, the possession of which is undisputed. Yet the majority are probably won by conquest, and on my own observation I may vouch for the ferocity of the struggles involved.

On December 9, 1923, at Concepción in the province of Tucumán, Argentina, I witnessed a very spirited fight of this sort, the description of which I take from my field notes written on the spot.

While walking along the portero road I heard a commotion in one of the palm trees and on coming closer saw that two *A. badius* were in the tree as was also a Spine-tail (*Synallaxis superciliosa*) and a nest of the latter. Both of the Bay-wings were harshly chattering at the Spine-tail which kept up a loud incessant alarm call. Then suddenly one of the Bay-wings flew directly at the Spine-tail which flew off hurriedly to the next palm. The Bay-wing pursued it and the two birds struck each other's bodies with a distinct thud and then, fighting madly with wings and feet, and screaming their loudest, the Bay-wing harsh and gutteral, the Spine-tail clear and ringing, they half fluttered, half dropped to the ground where they fought desperately for a minute or so. Then the Spine-tail quickly flew off across the road and dropped down in a field of sugar cane. The Bay-wing was close behind and the fight was renewed for a few seconds when the Spine-tail flew off making a wide circuit of the next palm.

In the meantime the other Bay-wing climbed on to the nest and was clambering all over it, evidently inspecting it, when the mate of the Spine-tail returned. Much to my surprise the Bay-wing acted just the opposite to its mate. It never uttered a note although the *Synallaxis* was screaching its loudest, and quietly and leisurely hopped off to one side and calmly watched the Spine-tail. A minute later the first Bay-wing returned and joined its mate but did not attack the Spine-tail. Then both Bay-wings flew off to the next palm about ten feet away, and the first *Synallaxis* returned and joined its mate at the nest. Both began screaming again at the Bay-wings but the latter did not answer and the noises died down.

On December 14, five days later, I found that the pair of Bay-wings were in possession of the nest and the Spine-tails had disappeared. One of the Cowbirds had a straw in its bill, but dropped it at my approach.

On December 19, five days later, I cut down this nest to see what it contained. (It was in a position making examination *in situ* impossible.) In it was one egg—a Bay-wing's. While Pedro, my peon assistant, and I were cutting down the nest the Bay-wings watched us from a tree about forty feet away. They uttered no sound and did not even seem agitated, i.e., they showed no signs of restlessness.

I never saw a fight between Bay-wings and Ovenbirds but I should judge that the latter, being larger than the Cowbirds, might not infrequently drive off the former, while the majority of Leñateros and Spinetails (particularly sp. of *Anumbius* and *Synallaxis*) are smaller and weaker than the Bay-wings and consequently stand less chance of success in conflicts with them.

Of all the Bay-wings' "nests" that I saw, was told of by others, or have found descriptions of in literature, the great majority were not built by the Cowbirds. In fact, as Hudson wrote, whenever the birds can get nests by fighting for them they will not build for themselves. Venturi writes that at Ocampo none of the Bay-wings' nests were built by the Bay-wings. Thus it will be seen that the nest-building instinct is still present; the birds can build for themselves if they have to, but the instinct is so weak that it shows itself only as a last resource. In all cases that came under my observation where the Bay-wings either seized or peacefully occupied nests not of their own building, they did some slight building themselves, usually amounting to a little addition to, or rearrangement of, the lining of the nests and occasionally they undertook more extensive alterations. So then it seems that the nest-building instinct usually manifests itself but only to a very slight degree.

On November 17, 1923, at Rio de Gastone, Tucumán, I saw a Bay-wing come off an empty nest of a *Synallaxis* sp. Wondering if the bird were looking for a place for its eggs I shot it and was surprised to find it a male with the testes much enlarged. I was puzzled by this as I had assumed quite confidently that it was a female by its actions. Three days later I saw another Bay-wing fly out of a nest of a Leñatero and pick up a piece of dead grass and fly back with it. When it once more came out of the nest I shot it and collected the nest. The nest contained a new lining inside which looked quite different from the old lining built by the woodhewers, but was not finished and is contained no eggs. The bird proved to be a male with the testes much enlarged. I wrote at the time in my field book:—"These two observations suggest that even in this Cowbird the female has lost even more entirely than hitherto suspected, the instinct to build and that the male seems to be the one that does the work. Because the two sexes are identical in plumage previous observers just recorded that this species sometimes builds its own nest but never attempted to find out if it was the male or the female that actually did it.

It was only natural to assume it to be the female but I doubt very much if the female does even as much nest-building as the male. If this is found to hold true then it would explain why male of *M. bonariensis* still takes such an interest in nests, a thing otherwise very puzzling. It may also explain why the male *badius* has, for a Cowbird, a female type of coloration. The male Bay-wing has always impressed me as being quite feminine in its color, in its lack of courtship display and distinctive song, and it may be that it is more feminine than I suspected."

After this I was very careful to watch building birds and, in my experience at least, it was always a male that was shot in the act of carrying building materials to a nest, but as will be seen later, the female also possesses the instinct as well.

The nests built by the Bay-wings are usually quite indifferent in construction, not frail or flimsy, but varying with the nature of the location. Hudson's description quoted above, of a "neat well-made nest. .in the fork of a branch, lined with horsehair" is undoubtedly true of his specimen but would not apply to any that I have seen. Leo Miller found a nest of this Cowbird in a hole in an adobe wall, 10 feet up. "It was constructed of soft grasses only and merely formed a pad for the eggs."

In the collection of Mr. Stewart Shipton at Concepción, Tucumán, is a nest built by *A. badius*. It was placed in a hole in a branch of a tree and was made of dead grasses, rootlets and small twigs, chiefly the latter two, was four and a half inches across and two and a half inches deep. Of course it must be remembered that the size of the nest depends on the size of the cavity in which it was built. On February 19, 1925, at Santa Elena, Entre Rios, I found a nest of a Bay-wing apparently built by the occupants. It was a fairly neat, strong, cup-shaped affair, eight inches across (outside measurements including wall) and three and a half inches deep. It was composed almost exclusively of straws, but there were a few feathers in the inside. I was told by a reliable resident observer, Mr. A. Philip, that he had seen the Bay-wings carrying straw to the nest site a good many times before I came to Santa Elena, which was 36 days before I found the nest (nest had 6 eggs, one of which hatched next day).

Judging by this and by several observations of my own I should say the time spent in nest-building is rather long but the process is very casual and disjointed as though the birds felt like quitting once in a while.

It seems that there is a good deal of variation in the sites chosen by Bay-wings in which to build. I have found their nests only in trees and, on one occasion, in a large *Opuntia* cactus, but I know of nests being built in holes in walls and on the cross bars of telegraph poles. One thing is constant throughout—all the nests are considerably removed from the ground. The lowest one in my experience was six feet up and the highest about 25 feet from the ground.

I suspect (but cannot prove) that most of the rather rare instances in which the Bay-wings build their own nests occur relatively early in the season, for later on there would be an abundance of nests of various Woodhewers and Ovenbirds for the Cowbirds to use. Venturi (Hartert and Venturi 1909, p. 185) somewhat foreshadows this suggestion when he writes that, ". . . In the spring, when the nests of *Phacellodomus* and *Synallaxis* are occupied by their owners, it (*A badius*) contents itself with excavating a cavity in the upper part of the nest and putting in it some twigs. At the second brood, it lays its eggs in the nests of these species, but it also appropriates the nests of *Furnarius* and *Amblycercus*."

Personally I doubt that *A. badius* is two-brooded, at least I never saw any sign of it, and feel that what Venturi refers to as a second brood should be interpreted as meaning birds breeding later in the season.

The Bay-wing is one of the latest breeding birds in Argentina, i.e., the majority breed at the very end of the season, February being the best month in which to find their eggs. Relatively few breed before late December although there are authentic records for November. In fact, in Tucumán, I observed Bay-wings examining nests as early as October 29, but the first definite sign of nest occupation was noted on November 20 when I shot a male in the act of building as related above.

The lateness of the breeding season is doubtless due to the fact that the supply of available nests (chiefly of Leñateros and Spine-tails) is assured at that season while a couple of months earlier not only is the number smaller but also the competition for them keener. In this connection it should be remembered that many Argentine birds prefer the nests of Leñateros and Horneros to any other nesting site. Hudson writes that in, ". . . . Buenos Aires the White-rumped Swallow, the Wren, and the Yellow Seedfinch prefer the ovens of the *Furnarius* to any other breeding place, but to obtain them they are obliged to struggle with *Progne tapera,* for this species has acquired the habit of breeding exclusively in the ovens. They cannot, however, compete with the *Progne,* and thus the increase of one species has to a great extent, deprived three others of their favorite breeding place. Again, *Machetornis rixosa* prefers the great nest of the *Anumbius*, and when other species compete with it for the nest they are invariably defeated. I have seen a pair of *Machetornis* after they had seized a nest attacked in their turn by a flock of 6 or 8 Bay-wings, but, in spite of the superior numbers, the fury of the *Machetornis* compelled them to raise the siege."

The same writer, in speaking of the Shiny Cowbird, *M. b. bonariensis,* makes the following statement. "A diminution of the number of birds that built domed nests would involve *M. bonariensis* in a struggle for nests, in which it would probably be defeated." Now, the Bay-wing is smaller than *bonariensis* so its chances of success during the height of the season would be still less to begin with and even less than that because it would want a nest for over a month whereas a few minutes would suffice for its parasitic congener to lay its egg therein.

Hudson and others write that the Bay-wing usually is attracted by domed nests but breaks a hole in the wall thereby admitting light into the nests before breeding in them. In this connection I may say that I never observed this and in all nests I found or saw, no holes had been broken through the walls.

In my experience, Spine-tails' and Leñateros' nests are used more frequently that Ovenbirds' (Horneros) by the Bay-winged Cowbird. Among the nests used by the Bay-wings are those of *Furnarius rufus, Anumbius acuticaudatus, Phacellodomus rufifrons,* several species of *Synallaxis,* and also of *Pseudoleistes virescens.*

A very peculiar thing that I noted many times in different parts of Argentina was that the Bay-wings take possession of nests and then guard them for two weeks before beginning to lay in them. This time is not spent in extensive repairs or alterations as the birds are idle most of the time.

On January 3, 1924, at Santa Elena, Entre Rios, I found a rather small nest of a *Synallaxis* in a small tree and saw a Bay-wing fly out of it. On examining the nest I found it to be empty. While in the tree, one of the Bay-wings came back and attempted to drive me off by flying close to me (within 5 feet). It finally alighted on a branch about 8 feet from me and watched silently from that perch. During the whole time it made no sound. Its mate came while I was still in the tree and flew close to the nest several times and then joined the first bird. Both then began to hop about restlessly but still remained silent. I watched this nest every day and it was not until two weeks later that the first egg was laid. This nest will be referred to below as nest A. The complete history of this and other nests follows:

History of Nest A

The nest was an old nest of a Spine-tail (*Synallaxis*) of unknown species. It was about twelve feet up in a rather small tree and was composed of twigs, sticks, etc.

PLATE II

Nest of Bay-winged Cowbirds
(In old nest of Woodhewer)

Same Nest Opened to Show the Eggs.
(Two of the Bay-wing and two of the Screaming Cowbird)

No hole had been broken into it by the Bay-wings who used only the original entrance. I found this nest on January 3, 1924, at Santa Elena in the Province of Entre Rios. This is the nest mentioned above to illustrate the time elapsing between first occupation and actual use by the cowbirds. To briefly repeat, the nest was empty, but the Bay-wings were bold in its defense. During the next five days I passed by the nest daily and always found the Bay-wings on guard. On January 8, at 3:50 P.M. both the Bay-wings flew off for a little while. I examined the nest and found it was still empty. A few minutes later one of the birds came back, flew to a branch not close to the nest and *chucked* several times. Then it flew to a nearby tree and its mate flew directly to it, not first coming to the nest tree. The first one then flew back to the nest tree and the other followed it; both flew up to the nest, one going inside and the other perched on a branch about 2 feet away. Thus they stayed for several minutes when, with harsh screams, a pair of Screaming Cowbirds flew into the tree and alighted about 8 feet from the nest and considerably below it. The Bay-wings apparently took no notice of them and remained silent. Then one of the Screaming Cowbirds hopped up to a branch close to the nest and was joined there shortly by its mate. Still the Bay-wings paid no attention to them. Then, quite suddenly, at 4:00 P.M. both of the intruders flew directly to the nest, one actually alighting on the rim, the other not having time to alight anywhere for the Bay-wing on guard above the nest immediately flew at the intruders and the three of them flew off. A few minutes later the two Screaming Cowbirds returned to the tree but the Bay-wing did not. Slowly by hopping from one branch to another, the two birds got close to the nest and again flew directly to it. Then the Bay-wing in the nest flew out and they all flew off. The Bay-wing did not go back in the nest but took up a position on top if it.

There was another dilapidated old nest of a Leñatero in the other side of the same tree and the two Screaming Cowbirds flew over to this. Soon another pair of their species flew into the tree and joined them. A minute later the second pair flew over to the Bay-wing's nest and were chased by the bird on guard. They flew back to the other pair at 4:06 P.M. both pairs flew off together screaming as they went. I waited until 4:15 P.M. but the other Bay-wing did not return. Next morning I saw both Bay-wings at the nest.

The next day, January 10, I brought a large double step ladder to the tree and set it up so that the top was flush with the nest, and about 10 feet away. During this time the two Bay-wings stayed near the nest, silently watching my two assistants and myself. Then I climbed up the ladder and looked over the top and still the birds stayed where they were. Seeing that they were so tame I moved the ladder closer until the top was only four feet from the nest. The birds flew off but a few seconds later came back, and, as I was climbing up, one of them flew over and perched on the top of the ladder. They were quite silent all this time. When I got to the top they flew off giving a few harsh *chuck* notes. I then fixed a board on the top of the ladder and chopped away two branches that obstructed the view of the nest. Not caring to take a chance of the Bay-wings deserting, I then left. On passing the place early in the afternoon I saw the birds back at the nest.

January 11. Spent all morning at the nest. In order to get a better view of the nest I chopped away one of the supporting branches. Still the Bay-wings were quite fearless and came back promptly. Then I made a hole in the near side of the nest to enable me to photograph the contents, and was greatly surprised to find it still empty. The Bay-wings had flown off when I opened the nest, but they soon came back and one of them went into the nest but came out again through the new opening a few seconds later. Two hours later a pair of Screaming Cowbirds alighted near the nest and were chased off by the Bay-wings. Why should the Bay-wings be so fearless in the defense of a nest that clearly was not built by them and in which they have not laid any eggs so far?

January 12. Spent the morning at the nest watching and photographing. At 8 A.M. a pair of Screaming Cowbirds flew into the tree, stayed a few seconds, and then left. It looks as though they are watching this nest waiting for an opportunity to lay in it.

January 15. The heavy wind last night had blown down the ladder and the other nest in the tree but the Bay-wing's nest was still intact and still empty and the birds around as before.

January 16. The nest was just as yesterday. No eggs yet. The birds seem to relieve each other on guard, at least while I am near. When one bird goes off to feed, the other stays on guard until the first one returns.

January 18. Did not visit the nest yesterday and got around it only by 5 P.M. today. Found only one Bay-wing which flew off to another tree as I approached. It seemed shyer than before. On examining the nest I was surprised to find 4 eggs, 2 of them Bay-wings' and 2 Screaming Cowbirds'. All four were fresh and unincubated.

January 19. The nest contained four eggs as yesterday. Only one Bay-wing seen and it flew off as I came close to the tree. It flew to another tree and began to *chuck* nervously when its mate began to sing from somewhere in a densely foliaged tree nearby.

January 23. In the afternoon, as soon as I got back from the islands where I had been since the 20th, I went to the nest and found the ladder was lying on the ground. The nest was still intact and contained four eggs as before. One Bay-wing was seen but it was shy and flew off as I approached the base of the tree. The other was not seen or heard.

January 24. The nest contained the four eggs as before. A Bay-wing came out of the nest at my approach and stayed near it until I went up the ladder to examine the nest. The other Bay-wing was close by in another tree. The one that was in the nest has broken one of its outer tail feathers and inasmuch as it is now possible to distinguish between it and its mate, this individual shall be called bird *A* and its mate *B*. I enlarged the opening I had made in the side of the nest to be able better to photograph the eggs. The birds came back after a few minutes and *A* got inside the nest while *B* perched above it and sang a little. *A* stayed in the nest only a few seconds when it flew out through the newly enlarged hole and both *A* and *B* perched near the nest *chucking* nervously. A few minutes later they both flew off but *B* came back in a second or so, perched above the nest began to sing. Soon *A* returned, inspected and entered the nest, but immediately came out again. Both *A* and *B* began to chuck again and this continued for a few minutes, when *A* got into the nest and *B* remained on its perch above it.

January 25. For photographic purposes I enlarged the hole to about 3 inches in diameter. Bird *B* seemed to be not at all disturbed over it in spite of the fact that I worked in plain sight of the bird, although *A* was quite nervous. After taking a photograph of the nest and eggs I waited to see if I could get a picture of *A* in the act of incubating. *B* examined the nest and perched near it or on it a good deal in the next hour and sang at frequent intervals but *A* never came. *A* had flown off when I photographed the nest and eggs. In fact for the next thirty minutes *A* was nowhere around. Later *A* returned to a nearby tree and *B* began to *chuck* and *A* replied in kind. Then *A* flew over to the nest tree but stayed only a minute and flew off to another tree where it stayed for a while. Not caring to take the risk of letting the eggs chill, I then left. Several hours later, on passing the place I saw *A* fly out of the nest.

January 26. Again tried to photograph *A* on the eggs but she (?) flew off and would not come back while I was within 50 feet of the tree. Bird *B* was as fearless as yesterday but while it examined the nest and eggs from time to time it did not once settle on the eggs. Bird *A* came near the nest only once and then just for an instant. In the beginning when I climbed up the ladder to fix the camera, both *A* and *B* remained in the tree *chucking* and showing signs of nervousness. Both then flew off but *B* quickly returned and stayed at the nest and left only once, when *A* came to a nearby tree and called a few times. *B* replied with a few *chuck* notes, flew over to *A*, and a few seconds later returned to its perch over the nest and sang a little.

Three Screaming Cowbirds flew into the tree but stayed only a few seconds and left. Several birds that happened to come near the nest were driven off by bird *B*. The birds thus chased away included a House Sparrow *(Passer domesticus),* a Gnatcatcher *(Polioptila dumicola)* and a little Woodpecker *(Dyctiopicus mixtus).*

January 28. Nest same as before. No eggs hatched yet. Bird *A* very shy but *B* still fearless but does not incubate.

January 29. Both *A* and *B* seemed a little more silent than before. *B* did not sing as frequently as it used to to. *A* seemed a little tamer today but would not settle on the eggs or even come near the nest while I was within fifty feet of it, but would stay in the tree much more than in the last few days.

January 30. When I visited the nest this morning at 7 A.M. one of the Bay-wing's eggs was hatched. *A* would not come to the nest while I was within 30 feet of the tree, but after I had removed the camera and sat on the ground perhaps 20 feet from the nest for about a quarter of an hour bird *A* came to the nest, entered, and quickly flew out again.

January 31. The other three eggs not yet hatched. I stayed about 50 feet from the tree for two hours but *A* would not go back to the nest while I was around.

February 1. The other eggs not hatched—probably *A* has stopped incubating and they are chilled. Both *A* and *B* getting slightly tamer. *A* was in the nest a good deal when I was near the tree. A very remarkable thing was noted today. Bird *A* stayed in the nest for a few minutes and then left and was gone for about half an hour when it returned. A few minutes later it went off again and this time I watched it following it for some distance and was amazed to see it pick up small twigs and straws, carry them a short distance and then drop them. It did this several times. The whole action was just like that of a bird in the process of nest-building. In spite of the number of days in which the bird has been incubating, in spite of the days in which it helped guard an empty nest before laying, in spite of the fact that there is a young one to feed, the instinct of nest-building has now cropped up in a very bizarre way under unusual cir-

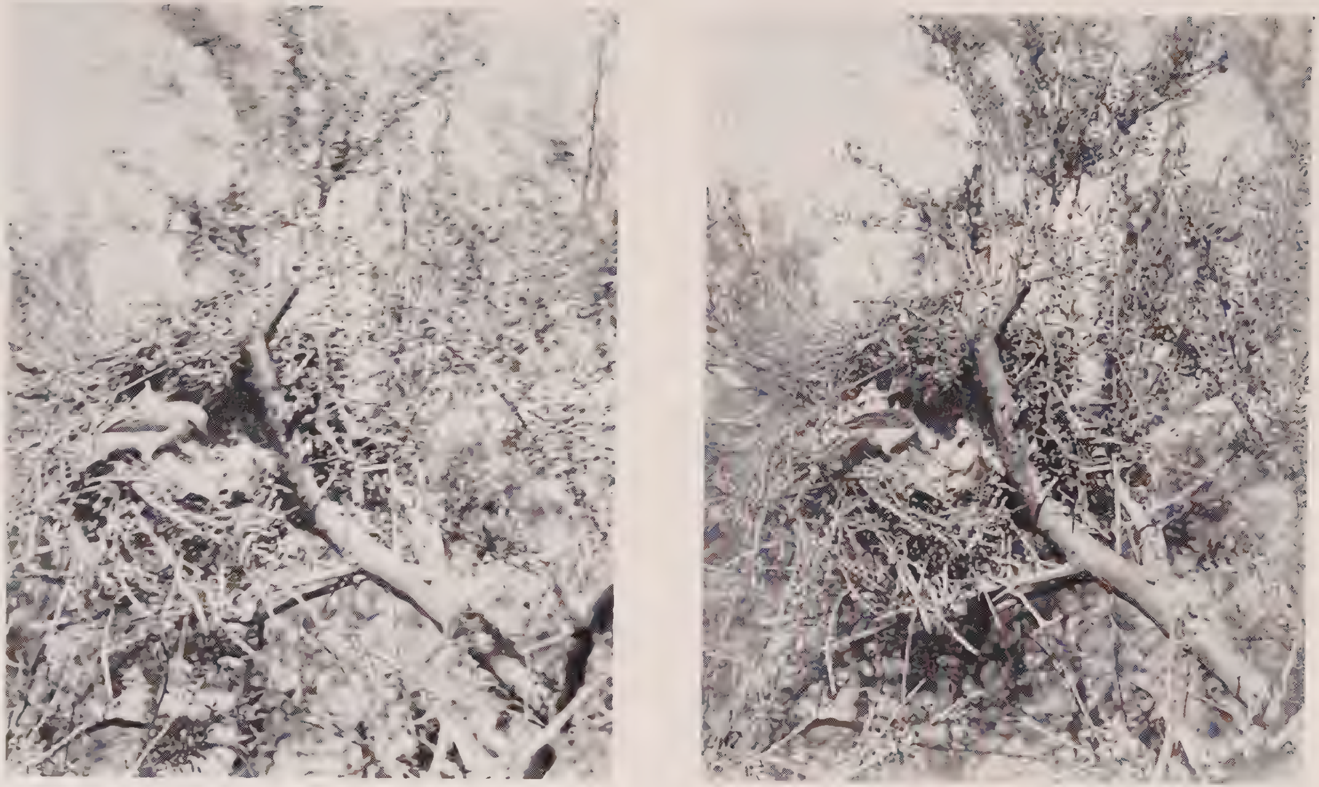


PLATE III.
MALE BAY-WINGED COWBIRD GUARDING AND INSPECTING NEST.

cumstances. Whatever else it may mean it shows that the building instinct is common to both sexes, a point hinted at some pages back.

February 2. There was a severe storm last night and this morning I was greatly disappointed to find the nest damaged and empty, the ladder lying down, and the birds gone. I found the dead nestling Bay-wing and the three eggs on the ground. All three had embryos ready to hatch but were smashed.

February 5. Found and shot Bay-wing *A*. It was not far from the site of the nest and was easily recognized by its broken outer tail feather. As I had previously surmised *A* was a female. The ovary was still large but I could not make out any discharged egg follicles although I tried as I wanted to know if it had laid only the two eggs or more.

Other Nests

Nest B. On February 4, 1924, at Santa Elena, Entre Rios, I found another nest of the Bay-winged Cowbird in an absolutely inaccessible place high up in a slender tree. The nest was obviously built by Leñateros, and judging by the actions of the Bay-wings, must have contained eggs well advanced in incubation, or young. One of the Bay-wings gave a few *chucks* and entered the nest while the other perched near by and sang its drowsy wheezy little song, acting exactly as did bird *B* in the first nest, described above. I shot it and found it to be a male with the testes greatly enlarged. At the shot the other Bay-wing flew out of the nest but came back in a few minutes, entered and stayed in the nest. I then left, as I had other nests to visit during the morning but several hours later I passed by it again and saw the Bay-wing bringing a large hymenopteran to the nest and heard the food calls of the young. This bears out my observations on the previous nest in that the bird corresponding to bird *B* was a male.

Nest C. On January 30 at the same place I found another Bay-wing's nest apparently built by the cowbirds. It was built of straws and placed in a horizontal fork of an *Acacia* tree about twelve feet from the ground. Directly over it and en- apparently built by the Cowbirds. It was built of straws and placed in a horizontal eggs of the Bay-wing and two of the Screaming Cowbird. The two latter were identical, and were doubtless the product of the same bird.

On February 9, or ten days later, none of the eggs had yet hatched. I chopped away some branches in order to photograph the nest and eggs. One of the birds was quite bold, the other much less so, during this operation. This led me to suspect that the eggs must be nearly ready to hatch.

February 10. One of the Screaming Cowbird eggs hatched today.

February 11. Today the other Screaming Cowbird egg hatched.

February 14. Very heavy rains last night. Both young Screaming Cowbirds gone—probably killed by the cold and wet and blown out of the nest. Two of the Bay-wings eggs gone also. On the ground beneath the nest was the broken shell of one of them while the other was intact. On blowing it, I found it to be addled.

February 15. Nest deserted, both eggs cold, no birds around. I collected the nest and the two eggs.

Summary of Nests and Nest-Building

1. The Bay-winged Cowbird can and does build its own nest if it cannot get a nest already built.

2. The Bay-wing prefers to breed in nests of Woodhewers and Spinetails and to a lesser extent in those of Ovenbirds.

3. The Bay-wing acquires these nests by fighting or as sometimes happens, it finds nests unoccupied and undisputed.

4. When breeding in such nests the Bay-wing usually adds to or alters the lining and may make even greater alterations.

5. The nests built by the Bay-wings vary considerably but are always open and off the ground. The favorite materials used are straw, dead grass, occasionally other things such as feathers and horsehair are used in the linings.

6. Both sexes possess the nest-building instinct but most of the work seems to be done by the male.

7. Many observers state that the Bay-wings break holes to admit light in nests of Woodhewers and Ovenbirds before they use them, but this is entirely contrary to my experience.

8. Nest-building seems to be slow and interrupted business with the Bay-winged Cowbird.

9. The Bay-winged Cowbird is one of the latest land birds to breed in Argentina.

10. This is probably due to the abundance of available nests late in the season, and their relative scarcity earlier.

11. The Bay-wings sometimes defend empty nests for a considerable time before laying in them.

12. The female is far bolder in the defense of the nest before she has laid any eggs than afterwards.

13. The defense of the nest is largely left to the male once the eggs are laid.

14. The male is extremely fearless in his defense of the nest.

15. Most of the nests *built* by Bay-wings are made fairly early in the season, while later on they use old nests of which the supply is then greatest.

Eggs and Egg-Laying

Review of the Literature

Hudson (1920, p. 114) writes that, "The eggs of the Bay-wing are five in number, nearly round, and densely marked with dusky reddish brown." Dalgleish (1881, pp. 245-246) describes the eggs as, ". . . . of a dirty white colour, closely freckled or marbled with large and small spots of greyish brown of two shades; average in size 38/40 x 28/40 inches." He also gives a good plate showing one of the eggs. Leo Miller, (1917, p. 591), writes that the eggs of the Bay-wing, ". . . . are easily distinguished from those of *M. bonariensis,* by their smaller size and intense coloration. They are elliptical in shape and heavily marked with reddish brown; frequently there is a scattering of short, thick lines of deep chocolate color or black on one of the ends or all over the eggs. Size of eggs 23.50 x 19.50."

Holland, in Entre Rios, (1892 p. 198) notes that the Bay-wing breeds throughout November in the disused nests of *Anumbius acuticaudatus* and lays five eggs.

All writers are agreed that this species lays five eggs. Hudson also states that sometimes two or more females lay together in one nest and has recorded as many as fourteen eggs in one nest. However, the eggs of the Screaming Cowbird are extremely hard to tell from the eggs of the Bay-winged Cowbird and the additional eggs may have been, in part, of the former species. In his early papers, before he began to understand the habits of the Cowbirds in Argentina, Hudson described the eggs of all three species in various papers, no two of which agree. These need not be considered here as they are wholly unreliable and it is impossible to tell what he really had each time. He corrected these errors himself in his later writings.

The Eggs and Egg-Laying Habits

The eggs of *Agelaioides badius* are whitish or dirty white in color, heavily streaked, spotted, mottled, or in some cases even marbled, with dark grayish brown, purplish brown, or reddish brown. They usually are more intensely marked than are the eggs of *bonariensis* or *ater*, and are very similar to those of *rufo-axillaris*. In shape they are ovately elliptical, the long axis being proportionately longer than in eggs of *bonariensis* and *ater*, giving them a somewhat slender appearance. While they vary in size as in color, the variations are not nearly as great as in the Shiny Cowbird (*bonariensis*). They average around 18 x 24 mm., but I have seen some that measured 20 x 26 mm. and others as little as 16.5 x 21 mm.

The variations in color have no geographical significance as in *bonariensis*. Some eggs are quite pale; a dirty white heavily blotched and dotted with dark purplish gray-brown; while others are so densely streaked and mottled with reddish brown as to look almost brick red. All the eggs of any one female are alike in size and color.

In texture the eggs of this Cowbird are slightly glossed as in the other species of the group, but are a little more brittle than those of its congeners.

The usual complement is five eggs and the species is single brooded. The eggs are laid at intervals of one day as in most birds and the female does not begin to incubate until the clutch is laid. Quite often only four eggs are laid and in some cases even less. In one case that I studied in Entre Rios, the female laid two eggs, a Screaming Cowbird also laid two eggs in the nest and the Bay-wing laid no more but began to incubate.

In his earlier papers Hudson wrote that this species sometimes lays an egg now and then in nests of other birds and leaves them to be cared for by the foster parents. This is not the case. The Bay-wing is not parasitical at all and the eggs which misled Hudson were probably those of the Screaming Cowbird. However, there seems to be some degree of imperfection in the Bay-wing's egg-laying habits. Hudson found that occasionally two or more females laid together in one nest. Allowing for the possibility that many of these extra eggs were not Bay-wing, but Screaming Cowbird eggs, it is still possible that in some cases more than one female Bay-wing used the same nest. I never found any definite instance of this kind myself, and Señor Pablo Girard, a resident naturalist in Tucumán, tells me, that of sixty-six nests of the Bay-winged Cowbird found by him in the past twenty years he has never found eggs of two different Bay-wings together, but that every single nest contained eggs of the Screaming Cowbird as well as of the Bay-wing. However, on one occasion I shot a female Bay-winged Cowbird just after it had come out of an old Ovenbird's nest. A minute later another Bay-wing flew to the nest, went in, and as it came out I shot it and was greatly surprised to find, on dissection, that it too was a female. Both birds were in breeding condition. The nest was inaccessable and I knocked it down by throwing stones at it. It fell and broke and I found the broken shells and spilled yolks of three Bay-winged Cowbird eggs, but could not tell from the fragments whether they were all the product of one bird. There is a nest in Mr. Shipton's collection that has eggs of more than one Bay-wing, as mentioned before (p. 11). I feel that it is quite likely that once in a while two Bay-wings may lay together but that such instances are rather rare. The protecting instincts of the female are very weak and two may lay together because of this weakness.

After the eggs are laid the female sits on them but is not a very close sitter. Easily frightened when incubating, but yet not at all shy once away from the eggs, the female Bay-winged Cowbird is a very puzzling example of bird psychology.

The laying season in Argentina is very late, reaching its height towards the last half of January and early February. Eggs have been found as early as the middle of November but such cases are rather unusual and probably depend on local conditions. Nests with young have been found as late as March fifth, but most of the birds are through breeding by the last week in February.

The incubation period of the eggs of this species is normally thirteen days, but occasionally lasts but twelve.

Summary

1. The Bay-winged Cowbird normally lays five eggs but sometimes four or fewer.
2. The eggs are laid at intervals of one day.
3. Incubation does not commence until all the eggs are laid.
4. Occasionally two females may lay together in the same nest.
5. The laying time is very late in the season reaching its height during the last half of January and early February, but may occasionally start as early as the middle of November. Such early cases are rather rare.
6. The period of incubation is thirteen days.

The Young

Nothing has been written about the young Bay-wing except for a single statement of Hudson's to the effect that the young of this species and of its parasite, the Screaming Cowbird, grow up together without any loss to either.

The Young in the Nest

Physical Development. On January 30, 1924, at Santa Elena, Entre Rios, an egg of a Bay-winged Cowbird in a nest that I had been watching daily was pipped at 7 A.M. and a few minutes later the young bird kicked free from its shell and lay as dead, apparently exhausted by its efforts. It lay this way for some minutes when it moved its head a little and uttered a very faint *peep*. As soon as the amniotic fluid had dried I examined the youngster carefully and weighed it. It weighed 2.3 grams and measured 42 mm. in length. The skin was dusky orange pink; the eye skin dusky-bluish green with no differently colored slit; the bill pinkish orange and with the gape white; the feet orange pink with light yellow claws; the down mouse-gray; and the inside of the mouth reddish. The down was present on the head, spinal, humeral, alar, and femoral tracts; the abdominal, crural, interscapular and neck pterylæ were not even indicated as yet. The neossoptiles were about 10 mm. long on the supraorbital tract while on the supraoccipital they were only 4 mm. in length. The down on the head was arranged in 2 rows, one over each eye, and a small supraoccipital line. The femoral tract was very sparsely clothed with down while the spinal pteryla was downy from the uropygium to the caudal end of the scapular region. The alar tract was represented only by a few neosoptiles in the region of the secondaries. The egg-tooth was a blunt pyramid about one mm. high and wide.

In the first day this young Cowbird did not grow or gain in weight at all, which is quite the contrary to what I found in the other species.

However this may have been due to the fact that the other eggs in the nest were not yet hatched and the old birds were more inclined to brood than to feed. Unfortunately a heavy storm broke down the nest the next night, smashing the eggs and killing the young bird.

I have no data on 2, 3, and 4 day-old Bay-wings but I examined a nest in which there was a bird that was probably five days old. The eyes were open and contour feathers had sprouted on all the pterylæ except the head and uropygium, but on the abdominal and crural tracts the feathers were still wholly encased in their sheaths which had only begun to pierce the skin. The egg tooth was still present. The bird weighed 20.2 grams.

The next day the sheaths of the rectrices began to show and those of the remiges to open. The egg tooth was less distinct than on the previous day. That afternoon a peon boy came to me with the news that the nest had been robbed by a Guira Cuckoo which ate the youngster and sucked the addled eggs.

Judging solely by incomplete evidence from several nests it seems that the young Bay-wing leaves the nest when about twelve days old. I shot one just out of the nest; certainly not more than a day out of the nest; and found it weighed 31.5 grams or 13.7 times its original weight on hatching. The cheeks and lores were bare; the gape white, still swollen and prominent; the bill dark horn color with a lighter tip; all the remiges and rectrices still partly enclosed in their sheaths, the later being still very short, 18 mm. long. No under wing coverts had yet sprouted and the feathers on the abdominal and spinal tracts were not long enough to fully cover the intervening apteria. The tarsi and toes were light horn color; the plumage the same as that of the adult minus the black loral mask as the lores were still bare. A few downy neossoptiles still remained clinging to the distal ends of some of the crown feathers. A nest mate of this bird was also collected. It was considerably larger than the first one and differed from it in that it had the chin fully feathered. It was covered with small mites. Both adult birds were seen in attendance on the young but neither of them did any actual feeding while I was around although both responded to the calls of the young birds. Both young and old birds had lepidopteran larvæ in their gizzards. The food given the young Bay-wing is entirely insectivorous. I have seen adults returning to their nests with "grubs" (either coleopteran larvæ or small caterpillars), large winged hymenopterans, and once even a locust.

Behavior and Development of Instincts. At birth the young Bay-wing possesses powers of orientation, righting itself if placed on its back.

It also has a food reaction which consists of raising the head and opening the mouth but this seems to exhaust it easily as it usually drops back and lies quietly in the nest for a time. Its general posture is a lying one, the "pot-belly" supporting it as much as its limbs. The initial call note is a faint *peep* shriller than the corresponding note in *M. bonariensis* or *M. ater.* This note becomes somewhat lisping after a few days but never developes into a beady *seer* as in *bonariensis* or *ater* but becomes a lisping, petulant *tsip tsip,* occasionally lengthened into a *tseep* note. It is quite clear for a nestling bird's call.

After the eyes open the bird begins to sit up more and its posture is more erect than before. Its food reactions are given now only when in the nest and only to its parents. I took a five-day-old Bay-wing out of the nest and tried to get it to beg for food but was unsuccessful. As will be seen later the young of *bonariensis* and *ater* beg for food very readily, in or out of the nest, from every passing creature.

I know of no real alarm calls of the young of this Cowbird but it may be that, living largely in domed nests, there is less need for it than in open-nesting species.

The young Bay-wings and the young Screaming Cowbirds get along together just as if they were all the same species. When about twelve days old, the birds leave the nest and usually perch close to it for some time, as though not trusting themselves entirely to the mercies of the world. They cannot fly but can make off on the ground at a surprising rate, using the wings to increase their speed by jumps that are something between short glides and leaps. The food reaction is now somewhat complicated. The bird not only raises its head and opens its bill and calls for food but rapidly flutters its wings and the bodily quivering is more pronounced than earlier in its nest life.

Unlike *M. bonariensis* and *M. ater,* the young Bay-wing exhibits the instinct of fear before leaving the nest, but, while not too trusting in the friendship of all passing birds, is not as shy as the young of some other birds. The first flights are short and awkward but after the bird is out of the nest a few days it can fly well enough to avoid easy capture.

The Young Out of the Nest

The young Bay-wings generally remain in the immediate vicinity of the nest for a few days and sometimes longer. The parent birds care for them for at least two weeks and I have seen youngsters in their post-juvenal molt still being fed by their parents. The food call is different from the corresponding note of the nestling. It is a rather loud but somewhat hesitating *tchuck* with a suggestion of stammering between the *t* and the *chuck* as though the young bird was not sure of itself.

FOOD

In its food habits the Bay-wing is similar to all the other Cowbirds in that it is more or less omnivorous, eating both animal and vegetable matter all year around. The young are fed entirely on insects, and while the adults eat large quantities of seeds and grain, they are more insectivorous than graminivorous. However this species seems to consume relatively more vegetable food than does *Molothrus bonariensis*. The Bay-wing is less often found around stables than any of the other Cowbirds and consequently eats less corn, as most of the grain (largely corn in South America) eaten by Cowbirds is picked up in stable yards near the feeding troughs or from the horse droppings. I have found the following items in gizzards of Bay-winged Cowbirds: weed seeds, corn, rice, locust remains, coleopteran and lepidoteran larvæ, flies, longicorn beetles, and once a small snail.

PLUMAGES AND MOLTS

The plumages and molts of the Bay-winged Cowbird are as follows:

Agelaioides badius badius

Male

1. Natal Down: mouse-gray.
2. Juvenal Plumage acquired by a complete postnatal molt.

Above; head, neck, mantle, scapulars, interscapulars, back, and rump grayish buffy-brown, most buffy on the interscapulars; upper tail-coverts olive-brown; tail feathers very dark olive-brown; lesser wing coverts sandy buffy-brown; middle coverts grayish light rufous; greater coverts dark blackish brown broadly edged with rufous, slightly brighter and less grayish than the middle coverts; primaries and secondaries dark blackish brown broadly edged externally with light rufous chestnut, darker on the primaries than on the secondaries; the basal three-fifths of the primaries pale chestnut; under wing-coverts pale isabelline gray; sides of head grayish buffy-brown; lores blackish; entire underparts sandy olive buffy-brown; bill, legs and feet brownish black. Occasionally the feathers of the mantle have slight blackish shaft streaks giving a somewhat streaked appearance to the upper back. Young birds are very similar to adults from which they can usually be told by the fact that in adults the auriculars are quite blackish as well as the lores and also that the bill is black in older birds. Some young are streaked below, but this varies.

3. First Winter Plumage acquired by wear a complete molt. Young birds now become indistinguishable from adults.

Similar to juvenal plumage but the auriculars more blackish; feathers of the mantle never with black shaft-streaks; bill black.

4. First Nuptial Plumage acquired by wear which is noticeable chiefly in the great reduction of the rufus edges of the wing feathers; otherwise like first winter plumage.

5. Adult Winter Plumage acquired by a complete postnuptial molt. Adults are indistinguishable from young birds in first winter plumage.

Above: head, neck, mantle, scapulars, interscapulars, back, and rump grayish buffy-brown, most buffy on the interscapulars; upper tail-coverts olive-brown; tail feathers very dark olive-brown; lesser wing coverts sandy buffy-brown; middle coverts light grayish rufus; greater coverts dark blackish brown broadly edged with rufus, slightly brighter and less grayish than the middle coverts; primaries and secondaries dark blackish-brown broadly edged externally with light rufus chestnut, darker in the primaries than in the secondaries; the basal three-fifths of the primaries pale chestnut; under wing coverts pale isabelline gray; sides of head grayish buffy-brown; lores and auriculars blackish; entire underparts sandy olive buffy-brown; bill, legs and feet dark brownish black, the bill being practically black.

6. Adult Nuptial Plumage acquired by wear as in young birds. Measurements (skins); wing 87-92 mm. (89.6 mm); tail 72-78 mm. (75.2 mm.); culmen, from base, 17.5-18.4 mm. (18.2 mm.).

Female

All plumages and molts similar to the corresponding plumages and molts in the male.

Size smaller.

Measurements (skins), wing 82-87 mm. (85 mm.); tail 68-73 mm. (70.8 mm.); culmen, from base, 16.5-18 mm.

Agelaioides badius bolivianus

Sexes alike as in preceding form. No young specimens of either sex seen. Adults are like those of *Agelaioides badius badius* but somewhat larger and browner above.

Measurements (skins): *Male:* wing 99-101 mm. (100 mm.); tail 79.5-83 mm. (81.5 mm.); culmen, from base, 19 mm.; *Female:* wing 92-94 mm. (93 mm.); tail 76-78 mm. (77 mm.); culmen, from base, 18.5 mm.

ENEMIES

We have no data as to any real enemies of the adult Bay-winged Cowbird, but in all probability the species suffers to some extent from hawks of various species. The Screaming Cowbird is parasitic on this species but its parasitism does not cause the death of the young of its host species as in other parasitic birds and is therefore not to be considered one of the natural checks upon the increase of the Bay-wing.

The late breeding of the Bay-winged Cowbird has brought about comparative safety for its young from the ravages of raptorial birds. Hawks and owls are most destructive to small birds during the season when there are young hawks and young owls to feed. These birds are all through rearing their young long before the majority of Bay-wings' eggs begin to hatch and consequently the young birds have comparatively little to fear. However, the White Ani or Guira Cuckoo, a peculiar type of Cuckoo, is quite partial to a diet of eggs, and at the time when the Bay-wings' breeding season is at its height, the latter species supplies most of this part of the Guira's diet. I have seen a Guira Cuckoo take a nestling out of a Bay-wing's nest and swallow it after beating it against a branch. There was no way of telling whether the nestling was a Bay-wing, or a Screaming Cowbird, but on the law of averages, both species would be equally affected. The extent to which the Cowbirds suffer from the epicurean appetite of the White Ani is not known, but I should judge it to be rather limited. Most of the White Anis I shot during the breeding months of the Bay-wing had nothing but locusts in their gizzards.

No parasitic insects or worms are known from Bay-winged Cowbirds. a giant toad, *Ceratophrys ornata,* has been found with the remains of a Bay-wing in its stomach but the bird was probably dead before the toad got it.

COMMON NAMES

The Bay-winged Cowbird goes under quite a few different names in Argentina.

a. Spanish names.
   1. Tordo
   2. Tordo colorado
   3. Tordo bayo
   4. Tordo mulato
   5. Tordo argentino
   6. Tordo de las cienagas
   7. Tordo musico
   8. Ala-canela
   9. Musico
   10. Mulato (also Mulata)
   11. Havia estéro
   12. Mulato musico
   13. El bayo
   14. Aza de Telha

b. English names.
   1. Bay-winged Cowbird
   2. Bay-wing
   3. Brown Finch

c. Native Indian names
   1. Murajú (also Murajó)
   2. Charé
   3. Burraca
   4. Urraquita

SYNONYMY

Agelaioides badius badius.

Tordo Pardo-roxizo, Azara, Apunt. i, p. 290.

Agelaius badius, Vieill., Nouv. Dict. d'Hist. Nat. XXXIV, 1819, p. 535.

Icterus fringillarius, Spix, Av. Bras. i, 1824, p. 68.

Dolichonyx badius, Cassin, Proc. Ac. Nat. Sc. Phil. 1866, p. 6 (monogr.).

Deemelioteucus badius, Stempelmann and Schulz, Bol. Ac. Nac. Cienc. Cordoba, 1890, X, p. 399 (Cordoba).

Molothrus badius, Hudson, Proc. Zool. Soc. Lond. 1870, p. 672 (habits); Sclater, Cat. Birds Brit. Mus. xi, 1886, p. 338 (description and range); Sclater and Hudson, Arg. Orn. i, 1888, p. 95 (habits, etc.); Aplin, Ibis 1894, p. 172 (habits in Uruguay); Kerr, Ibis 1901, p. 224; Ridgway, Bull. U.S. Nat. Mus. 50 part ii, 1902, p.

207; Lonnberg, Ibis, 1903, pp. 457, 471; Dabbene, Orn. Arg., 1910, p. 403 (distribution in Argentina); Grant, Ibis, 1911, p. 104; *et* Ibis, 1912, p. 278; Brabourne and Chubb, Birds S. Am., 1912, p. 435; Hussey, Auk, 1916, p. 399 (La Plata); Serie, Hornero, 1918, p. 73 (common names); Sanzin, Hornero, 1918, p. 152 (Mendoza); Wetmore, Auk, 1919, p. 197 (structure of palate); Marelli, Hornero 1919, p. 227 (food); Dabbene, Hornero, 1919, p. 247 (Martin Garcia Isl.); Tremoleras, Hornero, 1920, p. 24 (Uruguay); Renard, Hornero, 1920, p. 60; Arribalzaga, Hornero, 1920, p. 98 (Chaco); Daguerre, Hornero, 1922, p. 271 (prov. Buenos Aires); Spegazzini, Hornero 1922, p. 294 (eaten by *Ceratophrys ornata*); Pereyra, Hornero, 1923, p. 172 (Buenos Aires); Niedfield, Hornero, 1923, p. 189; Serie and Smyth, Hernero, 1923, p. 54 (Entre Rios); Giacomelli, Hornero, 1923, p. 70 (La Rioja); Daguerre, Hornero, 1924, p. 285 (habits).

Molothrus badius badius, Wetmore, Bull. U. S. Nat. Mus. 133, 1926, pp. 387-388 (habits, etc.).

Molobrus badius, Weyenbergh, Periodico Zoologico, Cordoba, iii, pt. 4, 1881, p. 319.

Agelaioides badius bolivianus

Icterus badius, Lafr. and d'Orb., Syn. Av. II. in Mag. Zool., 1838, cl. II., p. 7 (part; Cochabama and Sicasica, Bolivia).

Molothrus badius, Sclater and Salvin, Proc. Zool. Soc. Lond., 1879, p. 608 (Tilotilo, prov. Yungas, Cochabamba, Sicasica (ex d'Orb.)).

Molothrus badius bolivianus, Hellmayr, Verh. Orn. Ges. Bay. xiii, no. I, 1917, p. 108.

III

AGELAIOIDES FRINGILLARIUS

The Pale Cowbird

Geographic Range

The Pale Cowbird is an extremely rare and little known bird and its geographic distribution is known only from the few specimens existing in the museums of the world. It seems to be restricted to eastern Brazil. Specimens are known from Pernambuco, Ceará, and Minas Geraes, thereby indicating a rather extensive coastal range for this bird. No field observations have ever been recorded of this species and we have no data on its numerical status in different parts of its range. It is probably a very scarce and local bird or more specimens would have been collected. Less than a dozen examples are known.

Type Locality—Minas Geraes

Life History

The habits of the present species are probably very similar to those of its near relative, *Agelaioides badius,* but nothing has been published concerning them. Dr. von Ihering assumed that this bird, like *A. badius,* is not parasitic and this assumption has been generally accepted as a fact. In all probability it is true, but nevertheless it should be taken only as an assumption.

Plumages and Molts

Sexes alike. No young birds known. The adults are similar to those of *Agelaioides badius badius* but are very much lighter and paler. Above; head, neck, scapulars, and interscapulars tawny olive, the interscapulars with faintly darker streaks; lower back, rump, and upper tail-coverts tawny olive, less grayish than the rest of the upperparts; wing-coverts pale chestnut, the greater coverts with fuscous shaft streaks; primaries and secondaries light fuscous, the outer webs edged with pale chestnut, tips grayish fuscous; tail feathers light fuscous edged with grayish chestnut; sides of head tawny olive; lores and auriculars chætura drab; underparts pale sandy buff washed with light tawny on the throat, breast, flanks, and under tail-coverts; bill and feet dark brown.

Measurements (skin): *Male*—Wing 86 mm.; tail 65-71.5 mm.; culmen, from base, 16.5-18 mm. *Female*—Wing 86 mm.; tail 72 mm.; culmen, from base, 16.7 mm.

Common Names

Portuguese (Brazilian) names:
Casaca de couro
Pardo-rojizo
Tordo

English (book) names: Brazilian Cowbird; Pale Bay-winged Cowbird; Pale Cowbird; Sandy Cowbird.

Synonymy

Dolichonyx fuscipennis, Cassin, Proc. Ac. Nat. Sci. Phil., 1866, p. 7.

Molothrus fuscipennis, Cassin, Proc. Ac. Nat. Sci. Phil., 1866, p. 16.

Icterus fringillarius, Spix, Av. Bras., 1, 1824, p. 68, t. 65.

Molothrus fringillarius, Spix, Av. Bras., 1, 1824, p. 68, pl. 65; Sclater, Ibis, 1884, p. 8; Ridgway, Bull. U.S.N.M. 50, part ii, 1902, p. 207; Wetmore, Auk, 1919, p. 197 (structure of palate).

GENUS MOLOTHRUS

Typical, parasitic cowbirds with long, pointed wings, dark plumaged males, and a bowing type of courtship display.

KEY TO THE SPECIES

A. Wing tip less than twice as long as culmen .....subgenus *Molothrus*
  B. Body with a metallic blue or greenish sheen ....males
    C. Head coffee brown ....*M. ater* and races
    CC. Head not coffee brown ....*M. bonariensis* and races
  BB. Body brownish with no metallic sheen ....females
    C. Height of bill at base at least 2/3 length of culmen ....
    ....*M. bonariensis* and races
    CC. Height of bill at base less than 2/3 length of culmen ....
    ....*M. ater* and races
AA. Wing tip at least twice as long as culmen....subgenus *Strepitovagus*
one species, *M. rufo-axillaris*

IV

SUBGENUS STREPITOVAGUS
MOLOTHRUS RUFO-AXILLARIS

The Screaming Cowbird

Geographic Range

The Screaming Cowbird is found in the northern half of Argentina, Uruguay, Paraquay, southern Bolivia, and southeastern Brazil. It is the only one of the genus that has not become differentiated into two or more geographical races.

In Argentina it has been recorded from the following provinces: Rio Negro, Buenos Aires, Entre Rios, Santa Fé, Santiago del Estero, Catamarca, La Rioja, Cordoba, Tucumán, Formosa and Salta. I found it very common in Tucumán, and less so in Entre Rios. In the southern part of the province of Buenos Aires it is a common bird. Its numerical status exhibits a great deal of variation in various parts of its range. Inasmuch as it is wholly dependent on the Bay-winged Cowbird in its breeding habits it would be of interest to see if it occurs in places where the other is absent. I have never seen or heard of any such instance.

Chubb (1910, p. 644) writes that it is not common, but occurs, in Paraguay. Berlepsch (1887, p. 10) records it from Lambaré, Paraguay. It seems to be rather rare in Bolivia as there are very few records of its occurrence in that country. In the Carnegie Museum collection there is an adult male *M. rufo-axillaris* from Guanacor, Province of Cordillera, Bolivia, taken at an altitude of 700 meters. Nothing has been published concerning the status of this species in Brazil, except for the mere statement that it occurs in the southeastern part of the country.

Type Locality—Maldonado, Uruguay

Migration

The Screaming Cowbird is not migratory. It seems to be entirely sedentary, each individual probably spending its entire life within a few miles of its birthplace.

Courtship and Mating

Review of the Literature

Most observers apparently did not distinguish between this species and *M. bonariensis* which it greatly resembles in the field, and consequently there are very few published notes on its courtship habits.

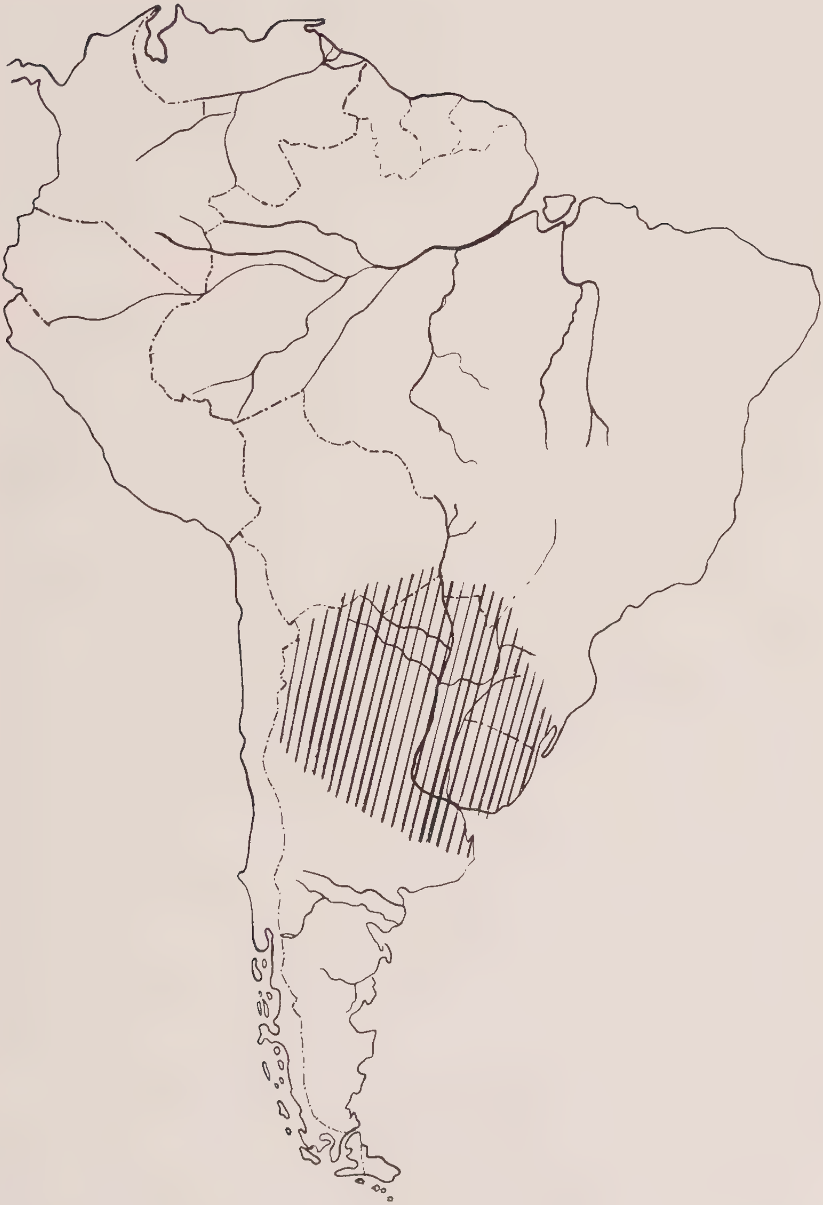


Fig. 2.

Geographic Distribution of Molothrus rufo-axillaris.

Hudson writes as follows of this species: "They are not singing birds; but the male sometimes, though rarely, attempts a song, and utters, with considerable effort, a series of chattering, unmelodious notes. The chirp with which he invites his mate to fly has the sound of a loud and smartly given kiss. . . . . But his most remarkable vocal performance is a cry beginning with a hollow-sounding internal note, and swelling into a sharp metallic ring; this is uttered with tail and wings spread and depressed, the whole plumage raised like that of a strutting turkey-cock, whilst the bird hops briskly up and down on its perch as if dancing." He also writes that the only mellow expression of this bird is the warning or alarm note given when approached in the breeding season.

Courtship Habits of the Screaming Cowbird

The Screaming Cowbird has two types of display, both being arboreal in nature. I have never seen a bird of this species display on the ground or in the air as do the common Cowbird of Argentina (*M. bonariensis*) and the North American form (*M. ater*). Although this species is almost always found in pairs and is more strictly monogamous than the other parasitic Cowbirds it displays less frequently than any of them. This may be partly due to its strict monogamy, or to the fact that the two sexes are similarly colored and that thereby the sight of a female might be less of a stimulus to the male than if there were a sexual difference in color.

Not only is display less indulged in by this species than by its other parasitic congeners, but also the courtship season seems to be very short. But the surprising thing is that the courtship season seems to end about a month before the breeding season begins. I began field work in Argentina very early in the spring, before the Shiny Cowbird had begun courting and pairing off for the breeding season, and yet I found the Screaming Cowbirds in pairs even then although they are one of the latest birds to breed, and the Shiny Cowbird is one of the early ones. From the second week in September until the middle of November, the male Screaming Cowbirds may be seen courting the females, but the relative rarity of the performance makes it difficult to say whether the main season ends at the end of October or in the middle of November, for the display is never common enough to determine any marked seasonal decline. Early in the spring, display is rather uncommon before the beginning of October. I first saw this bird display at Concepción, Province of Tucumán, on October 1.

The commoner of the two types of display may be described as follows. The male fluffs out all his body and head feathers, bends his tail forward and under, arches his wings to a nearly horizontal position and then quivers all over as though he were trying to catch his breath. After about a second of this quivering, without bowing forward at all, he finally emits a very rusty but quite explosive squeak *"dzeee."* His quivering, and the mode of delivery gives the impression that the *dzeee* note was stuck in his throat and was finally spit out. The bird goes through all the motions of nausea to a greater degree than the North American Cowbird usually does. The extent to which the wings are arched varies somewhat but they are never carried quite up to a horizontal position. The *dzeee* note is quickly followed by a *pe tzee* sound consisting of two syllables, the first very short and the second long and drawn out but shorter than the corresponding note in *M. bonariensis* and *M. ater.* These two notes are not nearly as clear and glassy as the corresponding notes of either of the other two Cowbirds just referred to and also are lower in pitch. The Screaming Cowbird does not give the three guttural preliminary notes that the other parasitic members of its genus do.

The other type of display is more rarely given, although to judge from Hudson's writings (quoted above) it would seem that in the La Plata district it may be considerably commoner. In fact, it is the only type of display with which he was familiar. This type agrees with the other except that while giving the *dzeee* note the bird hops up and down on its perch. I saw this type only a very few times. On one occasion the male kept getting closer to the female with each jump and the latter finally flew off. Usually, however, the male stands so close to the female that he could not very well jump closer to her without brushing against her.

The Screaming Cowbird is so strictly monogamous that only rather seldom does it happen that two males are found with one female. In fact, I observed this but twice out of hundreds of birds watched. Because of this the male very seldom has to use what may be termed an intimidation display with which to drive off another male. *M. bonariensis* and *M. ater* both point their bills towards the zenith when in close proximity to other males. If I had not once seen a male Screaming Cowbird "point" at a male Shiny Cowbird while feeding, I would never have suspected the possession of this habit by the former for it was the only time I ever saw one of this species use it.

Song and Call Notes

The vernacular name, Screaming Cowbird, coined for the present species by Hudson, suggests that vocal utterances play a very important part in the habits of this bird. While in some respects it is more noisy than the other Cowbirds, its relatively infrequent use of song tends to dispell this idea in the field, particularly in the breeding season when the other species are in song. In fact, during the first part of my Argentine field work I never thought of this bird as a "Screaming Cowbird" particularly.

The name was probably coined because Hudson knew of no more noticeable characteristic of the bird that could be fitted to serve this purpose. In my field book I wrote the following on November 2, nearly two months after I began field work: "Common everywhere, chiefly in pairs. . . . . They give a harsh scream when about to alight and also when about to start flying. I can see that they deserve in a measure the name Hudson gave them of 'Screaming Cowbird' although that appelation might imply that they are excessively noisy which they are not. In fact, it was not until today that I remembered the fact that they are called by that name, having previously thought of them only as *rufo-axillaris*." However, taking all seasons together, this species is more vocally inclined than the others and its notes are more like screams in quality than are those of its relatives.

The true song is of course confined to the male and is used in connection with the courtship displays and is described above. The first note is low, beady and somewhat explosive in that it comes very suddenly once it gets started. It is short and loud and effervesces in an ascending scale. Closely following it come two notes *pe tzeeee,* the first very short and separated by almost imperceptable intervals from the preceding and succeeding notes, the second long and drawn out but not as long as the corresponding note of *M. bonariensis.* These notes are in reality just an explosive but rusty squeak with a decidedly nasal quality, much like the squeaking notes of a Bronzed Grackle, but thinner and not as sonorous.

The call notes are rather limited in variety, there being only two distinct types, each of them used by both sexes equally.

The common note which seems to serve many purposes is the *chuck* note, a harsh, grating *chuck* very similar to the corresponding note of the Bay-winged Cowbird, higher and harsher than that of the Shiny Cowbird, and, to compare it with a North American bird sound, similar to the *chuck* call of a Red-winged Blackbird but higher in pitch. This note is commonly given when the birds are flying; indeed on some occasions the birds keep on calling as long as they are in flight. Almost invariably out of time with each other in their calls, several birds flying together produce a racket that sometimes earns them their name of Screaming Cowbird. However, when on the ground, they are remarkably silent. These chucking sounds are not restricted to flight but are frequently given when in the trees and when fighting, although usually in the latter case the birds are not nearly as vociferous as most birds are under similar excitement.

The other note is a hollow, internal, slightly metallic *plunk* note, like the sound of two pieces of metal hitting each other lightly, one piece being much larger and heavier than the other. I heard this anvil-like note very rarely. Once I saw a pair of Screaming Cowbirds fly away from a tree in which there was a nest of the Bay-winged Cowbird. One bird kept giving the ordinary *chuck* notes while the other gave a series of little hollow *plunk* sounds. This doubtless was what Hudson believed to be the warning or alarm call given when approached in the breeding season, but it is given so rarely that I question his interpretation of it. He called this note the only mellow expression in the vocabulary of this bird.

The female has no flight rattle in this species.

SEXUAL AND TERRITORIAL RELATIONS

Review of the Literature

Hudson (1920 p. 98) writes that while in winter this species may be seen in small groups of five or six individuals, it always is found in pairs in the breeding season. In fact, until he discovered that the species was parasitic in its breeding habits he assumed that it was not, chiefly because of its strict monogamy. He never imagined that the species was in any way unusual in its reproductive instinct because ". . . . in summer they are always seen in pairs, the male and the female being inseparable." He states a little further on that this is probably the only parasitical species in which there is conjugal fidelity. He also noticed that, ". . . . when approached in the breeding season, the pair always displayed great excitement and anxiety, like birds that have a nest, or that have selected a site on which to build one."

Sexual and Territorial Relations

In my field work I almost always found the Screaming Cowbird in twos, which, on collecting, invariably proved to be pairs. However, on a few occasions I saw groups of three, four, and even five. Once I saw three together examining the nest of a Spine-tail (*Synallaxis sp.*) acting like birds in breeding condition, but this was about a month before the beginning of the breeding season for this Cowbird. On the basis of my personal observations (which are both extensive and intensive) and on the testimony of other naturalists familiar with the present species in life, I may say that the Screaming Cowbird is definitely and uniformly monogamous. I know of no case to the contrary. In fact, the species not infrequently remains in pairs all the year round.

The territorial relations of the Screaming Cowbird are of interest in that they present a rather unusual state of affairs although superficially they seem quite ordinary.

This species, as already noted, pairs off early in the season (if it does not stay more or less paired all the year round), but does not begin to breed until nearly midsummer. Nevertheless, quite early in the season (October in northwest Argentina) this species establishes "singing trees" and territories.

Thus, on October 8, 1923, at Concepción, Tucumán, I wrote in my field book that *M. rufo-axillaris* seems to be either a little tamer than *M. bonariensis* or else they have established singing trees which they are loathe to leave while most of the *bonariensis* have not as yet done so. On several occasions when I approached trees in which both species were perching, the *bonariensis* flew off while the *rufo-axillaris* did not. I collected the pair of *rufo-axillaris* from one of these trees and found them to have enlarged gonads. All through the months of October and November this observation was repeated almost daily. Sometimes the period elapsing between the time of territorial establishment and actual inception of egg-laying amounts to over two months and occasionally almost to three months. Yet during all this time each pair seems to maintain its particular sphere of influence. Pairs from adjacent territories do not join or mix promiscuously although they do sometimes form temporary groups of 4-6 birds in neutral feeding areas. Having no nests to care for or young to provide with food, why should these birds establish territories and stay in them day after day often for nearly a quarter of a year without making the slightest use of them? One would hardly expect a non-parasitic species endowed with strong, fully developed parental instincts to limit its individual liberty of action for so long a time merely in anticipation of, and preparation for, its reproductive activities. The Goldfinch of North America (*Astragalinus tristis*) breeds at the same relative season (reversed) as the Screaming Cowbird but the flocks of the former do not break up for pairing and breeding purposes until only about a month or so before egg-laying commences. Furthermore, not only do they have to establish territories and procure mates in this month but also to build nests, which the Screaming Cowbird never does. The late breeding of the Goldfinch seems to be an adaption to seasonal food supply but in the Screaming Cowbird it seems an old habit phylogenetically derived from the ancestral stock of which the Bay-winged species is the surviving member. Food supply cannot explain why the Bay-wing and the present species breed so late in the season as the food of the young of both these birds is the same as that of the young Shiny Cowbird which is an early breeding bird. However, the Bay-wing breeds late because it habitually breeds in old nests of Leñateros and Spine-tails (*Anumbius* and *Synallaxis*) and Ovenbirds (*Furnarius*). Late in the season there are plenty of these nests available while earlier they are fewer in number and most are occupied by the builders and the Cowbirds would have to fight for them. The greater ease and certainty with which these nests could be obtained later in the season probably was largely responsible for the postponement of the breeding season of the Bay-winged Cowbird to its present months. The present bird, the Screaming Cowbird, shows in several ways that it is an offshot from the Bay-wing stock and its habit of breeding very late is doubtless due to a similar tardiness of reproductive season in the stock from which it evolved. It is interesting to notice, in passing, the strange irony that sometimes crops out in nature. The Bay-wing took to breeding late in the season to avoid work (nest-building). Then this was passed on to a new species, the Screaming Cowbird which in turn became parasitic, and, because very few other birds were breeding so late in the season, became dependent almost wholly on the Bay-wing, thereby doubling the work of rearing of young for the species that originally postponed its breeding to avoid work.

The late breeding coupled with fairly early establishment of "territories" which remain unused for a considerable length of time has brought about a very interesting condition in the Screaming Cowbird; namely not infrequent desertion of territories before egg-laying commences, with the subsequent establishment of new territories later as the reproductive urge becomes more imminent. In this connection the following observations are of interest.

In Concepción district, Tucumán, I watched several pairs of Screaming Cowbirds whose territories were more or less adjacent. As the season wore on I found that one pair forsook its territory and disappeared. The male of this pair was identifiable by an extreme harshness in his notes. He and his mate were well nigh inseparable. I never saw either bird alone more than a couple of feet away from the other, even when feeding on neutral ground. The desertion of the territory took place between the twenty-second and twenty-fourth of November. On December second I was surprised to find the same male securely established in a new territory about a mile away. With him constantly was a female, just as before. Whether or not it was the same female I could not say but of the identity of the male I had no doubt. The old territory of this male was occupied by a new pair of birds four days after it was deserted by the first pair. From this it would hardly seem possible that the "fitness" of this territory had in some way been lessened to the extent of causing the original pair of tenents to desert it. It was possible that the female of the original pair might have died and the male deserted on that account. In order to test this I shot the females of three pairs on three nearby and to me well known territories. In none of these cases did the males desert but they remained and soon found other mates. I can attribute this desertion to no cause other than the diminishing potency of the territorial instinct with the passing of time between the establishment and the utilization of the territory in question. Another bit of evidence in this connection was gathered at the height of the breeding season of the species (January) at Santa Elena in Entre Rios, eastern Argentina. I was studying a Bay-winged Cowbird's nest, making daily notes of everything concerned with it. On January 8, 1924, I noted that a pair of Screaming Cowbirds flew into the tree in which the nest was and stayed around in the near-by branches but they were kept away from the nest by the Bay-wings. Suddenly another pair of Screaming Cowbirds flew into the tree and joined the first pair. A minute later the second pair, (the newly arrived birds), flew over to the nest and were chased back by the Bay-wings. They flew back to the first pair and a little while later both pairs flew off together, screaming as they flew. It seemed that in this case one of the two pairs of Screaming Cowbirds was encroaching on a nest in the territory of the other. The birds being strictly monogamous, only one pair would occur in any one territory, and the other pair must have just recently come in. Screaming Cowbirds were not very plentiful in that district and there was plenty of land available for the other pair to use. There were also plenty of Bay-wings scattered over the country. This looked as though the second pair had not yet established themselves in a breeding territory although it was very late in the season. It is hardly possible that this pair had not attempted to do so before, but seemed likely that they were birds that had deserted a territory and were not yet settled in a new one.

The size of the breeding territories varies a great deal. In Tucumán I have known of as many as six pairs of Screaming Cowbirds to have their singing trees within an area of not more than a third of a square mile, while in Entre Rios, where the species was much rarer, individual territories in some cases were over a quarter of a square mile in extent and in one case very much larger still. The map (Text Fig. 3) shows the territory of a pair of Screaming Cowbirds at Santa Elena, Entre Rios, and also those of its Bay-winged victims.

EGGS AND EGG LAYING

Review of the Literature

Before Hudson discovered that the Screaming Cowbird was parasitical in its breeding habits, he and several other writers described nests and eggs which they attributed to this bird. There is no need to go into this misleading part of the literature as it would add nothing and only cause confusion.

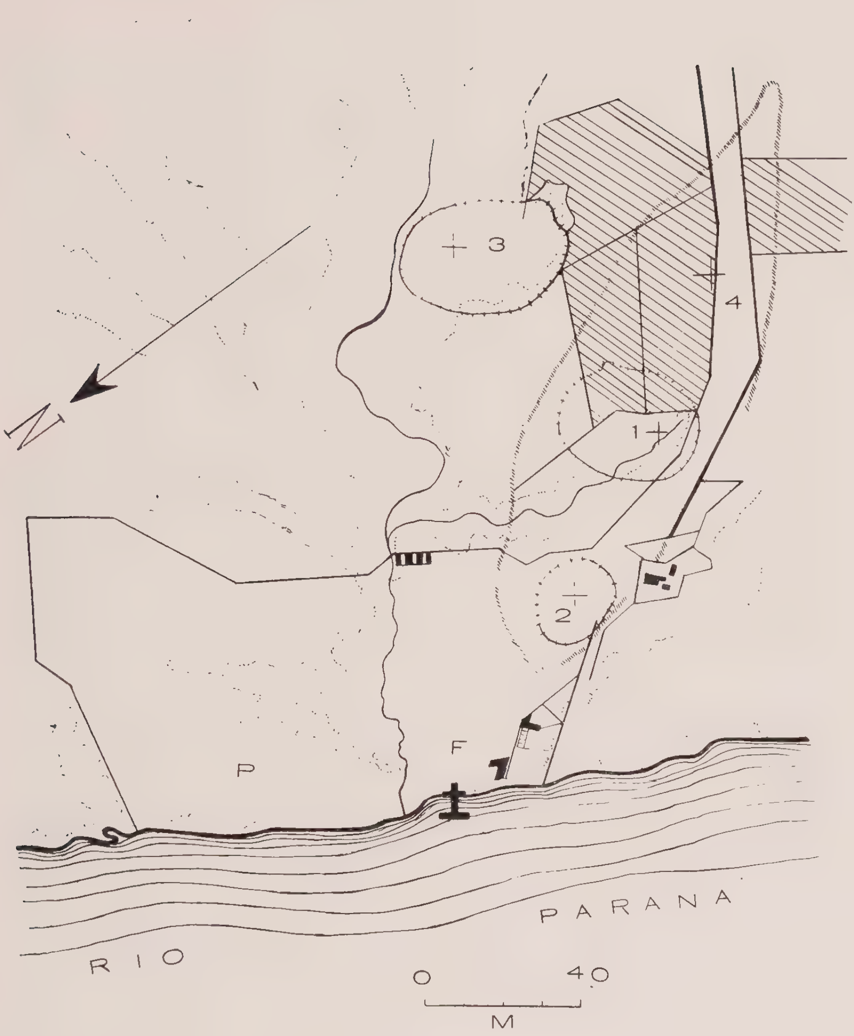


FIG. 3.

BREEDING TERRITORIES OF AGELAIOIDES BADIUS AND MOLOTHRUS RUFO-AXILLARIS
Santa Elena, Entre Rios, Argentina

1.—Territory of first pair of Bay-winged Cowbirds.
2.—Territory of second pair of Bay-winged Cowbirds.
3.—Territory of third pair of Bay-winged Cowbirds.
4.—Territory of a pair of Screaming Cowbirds.
The crosses indicate position of the nest-trees or, in the case of No. 4, the singing tree.
P.—The town or "Poblacion" of Santa Elena.
F.—The factory of the Bovril Company.
The scale is in meters.

Holland (Ibis 1892 p. 198), although ignorant of its parasitism, noted that the Screaming Cowbirds laid in usurped nests of the Leñatero *Anumbius acuticaudatus*, ". . . . where *M. badius* also makes its abode."

Hudson was the first to show that the Screaming Cowbird is parasitic. He found that it is parasitic on the Bay-winged Cowbird; that the eggs of the two species are almost identical in form, size and color; that the Screaming Cowbird lays five eggs; that the young of both species usually grow up together (which is not the case with the nest-mates of the young of the other parasitic Cowbirds); and that the young of the Screaming and the Bay-winged Cowbirds are impossible to tell apart although the adults of the two species are so very different.

"Instead of laying its eggs promiscuously in every receptacle that offers, it selects the nest of a single species; so that its selective instinct is related to the adaptive resemblances in its eggs and young to those of the species on which it is parasitical. Such an adaptive resemblance could not, of course, exist if it laid its eggs in the nests of more than one species, and it is certainly a circumstance eminently favorable to preservation. Then, there not being any such incongruity and unfitness as we find in nests into which other parasites intrude, there is no reason here to regard the foster parent's affection as blind and stupid, the similarity being close enough to baffle the keenest sagacity."

Daguerre (1924 p. 285) writes that he once watched a pair of Bay-wings take possession of a Leñatero's nest. The next day several pairs of Screaming Cowbirds visited the nest and climbed in and out and all over it. Several days later Señor Daguerre inspected the nest and found it to contain six eggs of the Bay-wing, and two of the Screaming Cowbird. He collected the eggs and the birds deserted. In the meantime the Leñateros built another nest and this in turn was taken over by the Bay-wings. This again was parasitized by the Screaming Cowbirds. A heavy storm broke down this nest and smashed the eggs. The Bay-wings took over a Bieteveo's (*Pitangus sulphuratus bolivianus*) nest and a couple of weeks later the young left the nest. They stayed together in a band and in the late summer some of them molted into black plumage showing that those individuals were Screaming Cowbirds.

Hartert and Venturi (1909 p. 184) write that the eggs of the Screaming Cowbird look very much like those of *A. badius* but may be distinguished from them by the fact that the shells of eggs of *M. rufo-axillaris* are stronger and harder to puncture than those of *A. badius.*

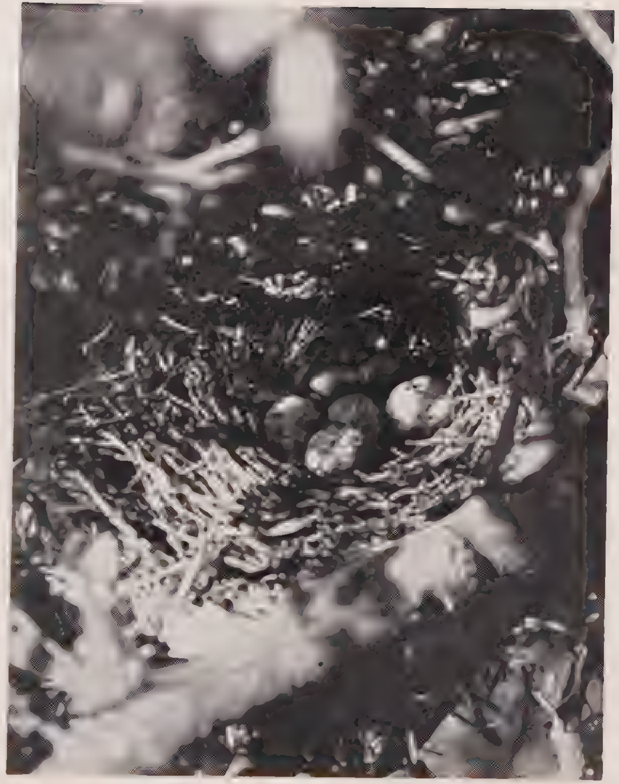
Eggs and Egg-Laying

The eggs of the Screaming Cowbird are very similar to those of the Bay-wing. In size they average around 18 x 23 mm.; the largest I have seen measure 19 x 25 mm.; the smallest 17 x 21 mm. They are ovately elliptical in shape but somewhat less slender in appearance than those of *A. badius.* In any nest it is always easy to distinguish between the eggs of the Screaming and of the Bay-winged Cowbird, but if a large series of both are mixed together it would be practically impossible to say definitely in all cases which eggs belonged to each species. However, although the two are so similar in series as to often make identification impossible, the eggs of the Screaming Cowbird are usually less brittle, are harder to pierce, and are less reddish in color than those of the Bay-wing. The majority of eggs of the former that I have seen are marked with purplish brown while most of those of the latter are spotted with reddish or dark grayish brown. However color is not a reliable criterion in all cases. The background of all the Screaming Cowbird's eggs examined is white. I have never seen an egg of this species that had a bluish or greenish tint. The eggs are dull in finish, very few having a little gloss on them. All the eggs of the same individual are alike.

The number of eggs laid by one bird in one season is stated by most writers to be five. However, there is no real proof for that statement although I should judge it to be very close to the truth. I have never found more than two eggs of a Screaming Cowbird in any one nest. In one case I knew that the same bird had also laid two eggs in another Bay-wing's nest about 200 yards from the first one. Several female Screaming Cowbirds were collected at different times during the breeding season and I never found more than four discharged egg follicles in the ovaries. However this does not mean that the species may not lay more than four. Hudson made his estimate of five because he found a Bay-wing's nest with ten eggs which at the time he assumed were all Bay-wings. Later when he found that the Screaming Cowbird was parasitic on the Bay-wing, and knowing that the latter lays five eggs, he assumed the other five were of the former species and that they were all laid by one individual. While this last assumption is not too well founded it is not unlikely that it is true, for the Screaming Cowbird is strictly monogamous and normally only one pair (which means only one female) would parasitize any one nest, so that all five eggs may have been the product of the same bird.

The eggs are laid at daily intervals. Once I inspected a Bay-wing's nest at Santa Elena, Entre Rios, and found it empty. Two days later I revisited it and found that the Bay-wing had laid two eggs and that a Screaming Cowbird had also laid two eggs in it. The two eggs of the latter were so similar that they undoubtedly were laid by the same bird. This proves two points;—first that the Screaming Cowbird lays its eggs at intervals of one day; and second that it does not remove one of the Bay-wing's eggs when laying into a nest of the latter.

The Screaming Cowbird is parasitic wholly on the Bay-winged Cowbird. Grant (Ibis 1911, p. 104) writes that he has found its eggs in nests of *Pseudoleistes virescens* as well. However, the Bay-wing sometimes breeds in old nests of *Pseudoleistes* and Grant admits that he has



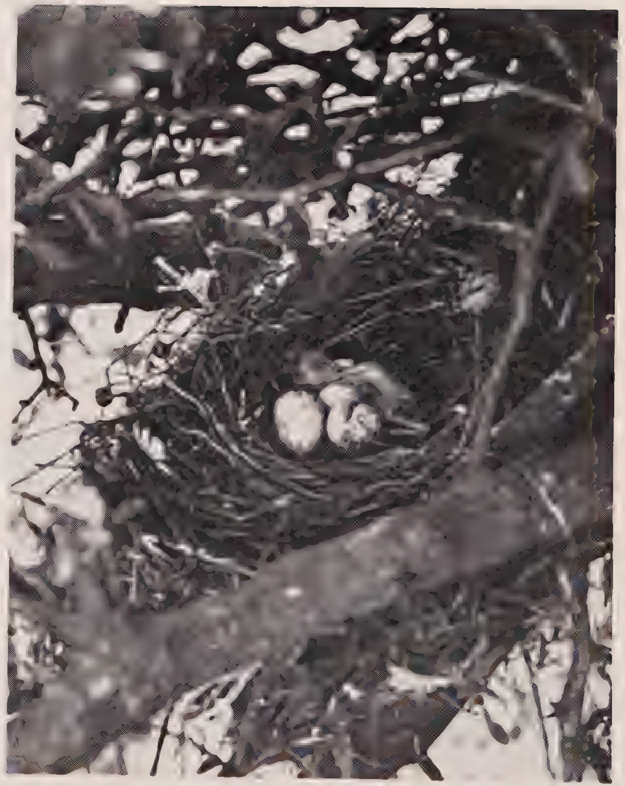


PLATE IV.

Nest of Bay-Winged Cowbird.
(With four eggs of the Bay-wing and two of the Screaming Cowbird)

Same Nest Some Time Later.
(With three eggs of the Bay-wing and one young of the Screaming Cowbird)

found nests of the *Pseudoleistes* with nothing but Cowbird's eggs in them so the case against the Screaming Cowbird bothering the Yellow-breasted Marsh Bird is none too well supported by the evidence.

Hudson was greatly puzzled over the fact that the Bay-wing was parasitized by the Screaming, but not by the Shiny, Cowbird. The explanation is simple. The Bay-wings usually breed in old Leñateros' nests and the Shiny Cowbirds seldom molest such nests. Also by the time the Bay-wings are nesting in numbers most of the Shiny Cowbirds are nearly through laying. The Screaming Cowbird breeds late and the Bay-wing is the only species breeding in numbers at that time. Also the Screaming Cowbirds seem to prefer the Woodhewers' nest to any other.

The incubation period of the Screaming Cowbird is from twelve to thirteen days.

THE YOUNG

Hudson is the only observer who was written anything about the young Screaming Cowbird and his notes are very scanty and incomplete. He writes that the young of this species and those of its victim, the Bay-winged Cowbird, *Agelaioides badius,* are alike in coloration, voice, and habits to such an extent that the keenest observer cannot tell the two apart. "But it may be questioned whether this is really a case of an external resemblance of one species to another acquired by natural selection for its better preservation. Possibly the young *M. rufo-axillaris* in the first stage of its plumage exhibits the ancestral type—that of the progenitor of both species. If *M. badius* belonged to some other group —*Sturnella* or *Pseudoleistes,* for instance— it would scarcely be possible to doubt that the resemblance of the young *M. rufo-axillaris* to its foster brothers resulted from mimicry; but as both species belong to the limited, well-defined group *Molothrus,* the resemblance may be ascribed to community of descent."

The Young in the Nest

Physical Development. Early in February, 1924, at Santa Elena, Entre Rios, I found and watched a nest of the Bay-winged Cowbird containing two eggs of the Screaming Cowbird. On February 10, one of the latter eggs hatched. The amniotic fluid was completely dried when I found the young bird that morning so it must have hatched over an hour before. It weighed 2.4 grams and measured 43 mm. in length. The skin was orange pink inclined to be dusky in hue; eye skin bluish green; feet pinkish yellow; bill pinkish yellow with the gape swollen and white in color; interior of mouth reddish, claws light yellowish; down dusky mouse gray. The neossoptiles were present only on the head, spinal, humeral, and alar tracts; the other pterylæ were not even indicated in any way. The down on the head was longer than that on the back and measured about 10 mm. to 4 mm. for the spinal neossoptiles. No down was present on the femoral tracts, disagreeing in this respect with the newly hatched Bay-wing. The down on the spinal tract extended from the uropygium to the caudal end of the interscapular region. The egg-tooth was about 1 mm. high and wide being pyramidal in shape.

During the first day the skin changed in color from pink to orange with even a slight yellow tinge. No change in size or weight was noted during the first day.

Neossoptiles appeared in the femoral tract on the second day and were slightly lighter in color than those of the back and measured 8 mm. in length. There was a slight amount of growth during this day.

When three days old the young Screaming Cowbird measured 48 mm. in length and weighed 6 grams; the bill had lost its pinkish tint; the primaries and secondaries began to show beneath the skin but had not yet broken through. The eyes were still closed and the bird was evidently weak from lack of sufficient care on the part of its foster parents.

The next day the bird was found dead in the nest. I have no data on 4, 5, or 6 days old Screaming Cowbirds. I found one that I judged to be about 7 days old in another Bay-wing's nest. The eyes were open; contour feathers were present on all the tracts except the head, but in the cural and abdominal pterylæ the feathers were still almost wholly encased in their sheaths. The sheaths of the rectrices were just beginning to show while those of the remiges were slightly opened and the enclosed feathers spreading at the tips. The egg-tooth was no longer very distinct. This bird was eaten by a Guira Cuckoo the next day.

Incomplete and non-consecutive observations on several other nests seem to indicate that the young Screaming Cowbird stays in the nest until it is about twelve days old. Because of the great similarity between the young of this species and of the Bay-wing it was impossible in most cases to tell the specific identity of each youngster and for this reason my notes are incomplete. All the above data refers to authentically identified Screaming Cowbirds. The food given the young of this species is exactly the same as that fed by the adult Bay-wings to their own young and is entirely insectivorous.

Behavior and Development of Instincts. At birth the young Screaming Cowbird possesses powers of orientation sufficient to right itself if placed on its back. It also has a food reaction, exactly like that of the

Bay-wing, which consists of raising the head and opening wide the mouth and quivering slightly all over. The initial call note is a faint *peep* like that of the young of its host species, the Bay-wing. It assumes a lisping character after the third day and the note changes from a *peep* to a *tsip*. The bird usually lies in the nest supporting itself on its belly more than on its limbs.

After the eyes open the bird begins to assume a more erect, sitting position. The food reaction is more vigorous than before, the bodily quivering being much more pronounced. Unlike the young Bay-wing, the young Screaming Cowbird does not associate this food reaction with the nest or the presence of the foster-parents. I once took a 7 day old bird out of a nest and it begged for food in my hand, giving the complete food reaction. The instinct of fear is developed in this species to a notably lesser extent than in the Bay-wing but more so than in the other two species of its genus.

The Young Out of the Nest

When about twelve days old the young bird leaves the nest; usually together with its foster brothers and from then on it is impossible to tell the two apart in the field. However, it seems that the habits of the two are identical and it is not until the inception of the postjuvenal molt that any difference becomes apparent.

I fully agree with Hudson in looking upon the close resemblance between the young of the Screaming and Bay-winged Cowbirds as being due to community of descent rather than to any adaptive mimicry. When we see how the young of the other parasitic Cowbirds get along so well with a great variety of species whose young they do not so closely resemble, the value of adaptive mimicry seems non-existent.

Plumages and Molts

The plumages of the Screaming Cowbird are very interesting in their phylogenetic significance. Although the adults are both black, the plumage of the young shows their undoubted descent from, and close relation to, the Bay-winged Cowbird. Similarly the dark coloration of the female in the present species forshadows the condition found in the Red-eyed Cowbird which is in turn descended from the *rufo-axillaris* stock. So then in its various plumages the Screaming Cowbird not only affords a clue to its past but also a link that binds it to its phylogenetic progeny. It is as fine an example of a "link species" as may be found anywhere in the class *Aves*.

The plumages and molts are as follows.

Male

1. Natal Down: mouse-gray.

2. Juvenal Plumage acquired by a complete postnatal molt.

Similar to the juvenal plumage of its host species, *A. badius*. Above; head, neck, mantle, scapulars, interscapulars, back, and rump grayish-buffy-brown; upper tail-coverts olive-brown; tail feathers very dark olive-brown; lesser wing-coverts sandy buffy-brown; middle coverts light grayish rufous; greater coverts dark fuscous broadly edged with rufous, the rufous slightly brighter and less grayish than the middle coverts; primaries and secondaries dark fuscous externally edged with light rufous chestnut, darker on the primaries than the secondaries; under wing coverts pale isabelline gray; sides of head grayish buffy-brown; lores blackish brown; entire underparts sandy olive buffy-brown; bill, legs, and feet brownish-black. In some specimens the upper and underparts are slightly streaked but others seem to be entirely without streaks. It is impossible to distinguish between young of this species and of *A. badius* until they are full grown when *badius* may be identified by its longer bill and more rounded wing.

3. First Winter Plumage acquired by a complete postjuvenal molt. Young birds now become indistinguishable from adults. While molting however, they present a very striking appearance being irregularly blotched and marked with black (new feathers coming in) and pale brownish (old feathers not yet dropped). The body feathers begin to molt first, the molt being apparently irregular on the head and body, and then the wings begin to molt starting with the innermost primaries and outermost secondaries. The tail molt is started after the innermost primaries are replaced by new feathers. In eastern Argentina this molt takes place in March. The first winter plumage is as follows: entire body, head, wings, and tail dark black with a dull (not shiny) gloss tinged with deep purplish blue-black, the wings and tail faintly glossed with greenish; some of the axillars bright chestnut; bill and feet black.

4. First Nuptial Plumage apparently acquired by wear. This is a point on which more data is needed. Similar to the first winter plumage.

5. Adult Winter Plumage acquired by a complete postnuptial molt. Adults are ordinarily not distinguishable from young birds in first winter plumage but seem to have more of the axillaries chestnut or at least to have the chestnut feathers better developed.

6. Adult Nuptial Plumage acquired by wear as in young birds.

Measurements (skins): wing 108-115 mm. (112 mm.); tail 77-82 mm. (79.2 mm.); culmen from base 16-18 mm. (17 mm.).

Female

All plumages and molts similar to the corresponding plumages and molts in the male.

Measurements (skins): wing 104-105 mm. (104.7 mm.); tail 79-82 mm. (80.3 mm.); culmen from base 15-15.5 mm. (15.3).

FOOD

In its food habits the Screaming Cowbird is very similar to the Shiny Cowbird, eating both insects and seeds with equal relish and, in the vicinity of stable yards, picking up corn and rice to vary and embellish its diet. On the whole this species is somewhat more insectivorous than graminivorous, but some individuals whose gizzards were examined had been feeding exclusively on seeds and corn. This species does not frequent the neighborhood of horses and cattle as much as do *M. bonariensis* and *M. ater* but more so than *A. badius,* and the amount of flying insects devoured bears approximately the same relationship in all four species as does the extent of their companionship with grazing beasts. It seems that most of the flying insects eaten are captured by the unwitting assistance of cattle and horses. These animals when grazing scare up all locusts, leaf-hoppers, etc., that may be hidden in the grass, and as they fly up they are snapped at by the Cowbirds near by. It is for this reason that the birds usually stay nearer the mouths of the grazing animals than near other parts of their bodies.

There seems to be little or no variation in the diet of the Screaming Cowbird from one part of the year to another except that in late summer they often resort to the rice fields with *M. bonariensis* and consume considerable quantities of rice. I have found weed seeds, corn, rice, locusts, flies, coleopteran larvæ, small moths, caterpillars, and what looked like pentatomid remains in gizzards of these birds.

Enemies

The Screaming Cowbird seems to be quite free from enemies in its adult life. We have no definite information of any raptorial bird or carnivorous mammal killing a Screaming Cowbird. However there is no reason to suppose that such cases do not occur.

The eggs and nestlings of this species are sometimes eaten by Guira Cuckoos *(Guira guira)* along with the eggs and young of the Bay-winged Cowbird.

No parasitic insects and worms have been recorded from the Screaming Cowbird.

Common Names

The Screaming Cowbird is not distinguished from the Shiny Cowbird by most of the people in Argentina and consequently the names applied to the latter species are also used for the present one. However all the names used for this bird are not common to both species. The following names are used solely for the Screaming Cowbird.

a. English names
  1. Screaming Cowbird

b. Spanish names
  1. Guitarerro
  2. Chopi
  3. Tordo de pico corto

c. Native Indian names.............Urrucum (in Bolivia)

In addition to these it should be said that the Spanish name *Tordo negro* is applied more commonly to this species than to the Shiny Cowbird, and is an indication that at least some of the peons recognize the difference between the two.

SYNONYMY

Molothrus rufo-axillaris

Icterus brevirostris, d'Orb. & Lafr., Syn. Av., Mag. de Zool. 1838, ii, p. 7; Berlepsch, Journ. f. Orn., 1887, pp. 10, 116; Ihering, Revista Mus. Paulista, vi, p. 323.

Molothrus rufo-axillaris, Cassin, Proc. Ac. Nat. Sc. Phil., 1886, pp. 14, 23; Sclater and Salvin, Proc. Zool. Soc. Lond., 1868, p. 140; Nom. Av. Neotr. 1873, p. 37; Hudson, Proc. Zool. Soc. Lond., 1872, p. 809; 1874, p. 161; Durnford, Ibis, 1877, p. 174; White, Proc. Zool. Soc. Lond., 1882., p. 601; Barrows, Bull. N. O. Cl., 1883, p. 134 (habits in Argentina and Uruguay); Ridgway, Bull. U. S. Nat. Mus., no. 50, part ii, 1902, p. 207; Grant, Ibis, 1912, p. 278, (habits); Wetmore, Auk, 1919, p. 197 (structure of palate).

Molothrus rufoaxillaris, Sclater and Hudson, Arg, Orn., i. 1888, p. 86, pl. vi, fig. 2; Sclater, Cat. Birds Brit., xi, 1886, p. 338; Aplin, Ibis 1894, p. 172 (habits in Uruguay); Grant, Ibis, 1911, p. 104 (habits).

Molobrus brevirostris, Stemplemann and Schulz, Bol. Ac. Nac, Cienc. Cordoba, 1890, xi, p. 399 (Cordoba).

Molothrus brevirostris, Chubb, Iris, 1910, p. 644 (Paraguay); Dabbene, Orn. Arg., 1910, p. 402 (range in Argentina); Brabourne and Chubb, 1912, p. 435 (range); Dabbene, Hornero, 1919, p. 247 (Martin Garcia Isl.); Tremoleras, Hornero 1920, p. 24 (Uruguay); Arribalzaga, Hornero 1920, p. 98 (Chaco); Daguerre, Hornero, 1922, p. 271 (prov. Buenos Aires); Pereyra, Hornero 1923, p. 172 (Buenos Aires); Giacomelli, Hornero, 1923, p. 70 (La Rioja); Daguerre, Hornero, 1924, p. 285 (habits); Wetmore, Bull. U. S. Nat. Mus. no. 133, 1926, p. 386 (habits, etc.)

Molothrus rufiaxilla, Weyenbergh, Periodico Zoologico, iii, pt. 4, 1881, p. 319 (Argentina).

V

SUBGENUS MOLOTHRUS

MOLOTHRUS BONARIENSIS

The Shiny Cowbird

KEY TO THE SUBSPECIES

A. Body with no bright metallic sheen .... females.
  B. Wing length less than 90 mm. .... *minimus.*
  BB. Wing length more than 90 mm. ....
    C. Wing length more than 108 mm. .... *cabanisii.*
    CC. Wing length less than 108 mm.
      D. Middle of abdomen lighter than rest of underparts and streaked with olive-brown .... *occidentalis.*
      DD. Middle of abodomen not lighter than rest of underparts and not streaked with olive-brown.
        E. Entire body dark blackish .... *melanogyna.*
        EE. Body not blackish but brownish.
          F. Underparts almost as dark as back.
            G. Wing length more than 98 mm. .... *aequatorialis.*
            GG. Wing length less than 98 mm. .... *milleri.*
          FF. Underparts much lighter than back.
            G. Tail 80 mm. or longer .... *venezuelensis.*
            GG. Tail less than 80 mm. .... *bonariensis.*
AA. Body with a bright metallic sheen .... males.
  B. Wing length more than 120 mm.
    C. Wing length more than 125 mm., tail more than 100 mm. .... *cabanisii.*
    CC. Wing length less than 125 mm., tail less than 100 mm. .... *aequatorialis.*
  BB. Wing length less than 120 mm.
    C. Wing length less than 100 mm. .... *minimus.*
    CC. Wing length more than 100 mm. .... *bonariensis**
occidentalis
venezuelensis
milleri
melanogyna

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* The males of *occidentalis* and *venezuelensis* are usually more glossed with purple than are males of *bonariensis, milleri,* and *melanogyna,* but as this color fades in museum specimens it cannot be relied upon in all cases. The measurements for these five races greatly overlap each other and the males are best identified by locality as the subspecific characters of the races are based on females.

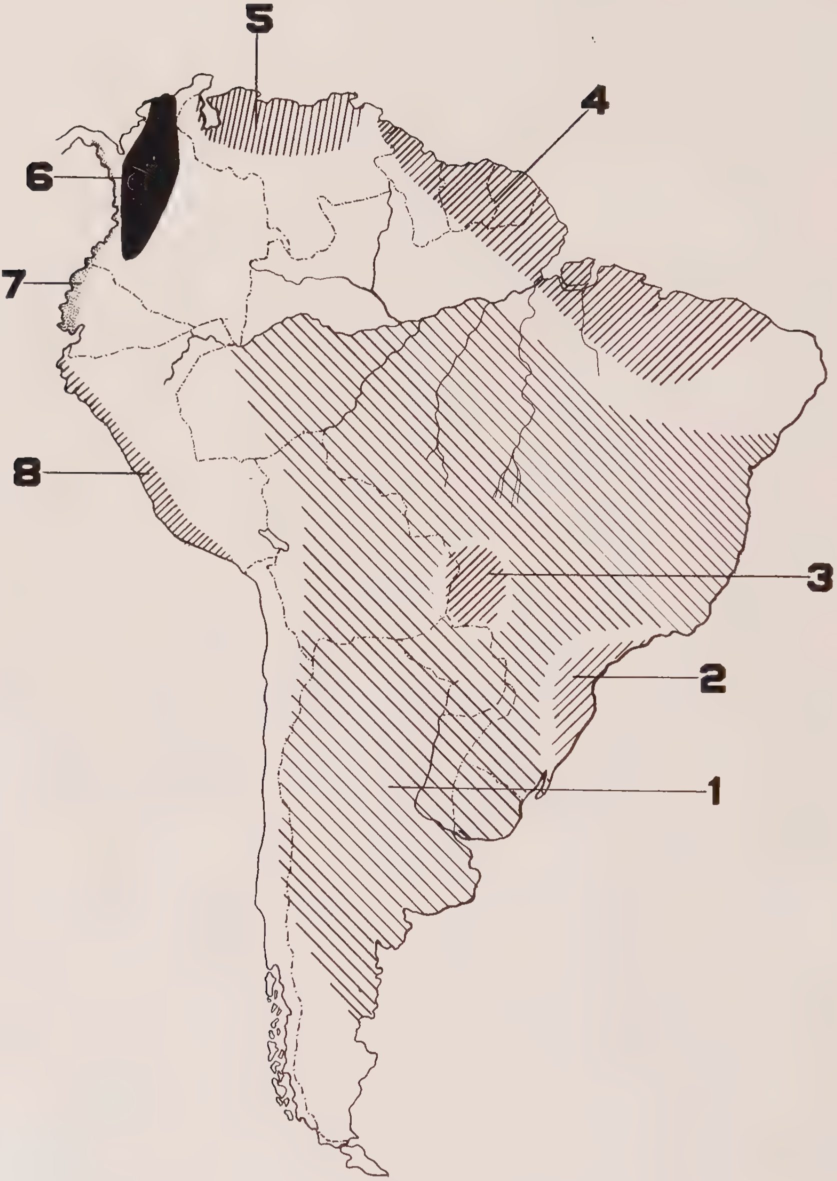


FIG. 4.

GEOGRAPHIC DISTRIBUTION OF MOLOTHRUS BONARIENSIS.

1.—Range of *Molothrus b. bonariensis.*
2.—Range of *Molothrus b. melanogyna.*
3.—Range of *Molothrus b. milleri.*
4.—Range of *Molothrus b. minimus.*
5.—Range of *Molothrus b. venezuelensis.*
6.—Range of *Molothrus b. cabanisii.*
7.—Range of *Molothrus b. aequatorialis.*
8.—Range of *Molothrus b. occidentalis.*

Average measurements for the males of these races are as follows:

bonariensis	wing 114.5 mm.	tail 82.6 mm.	culmen 19.5 mm.
occidentalis	wing 109.6 mm.	tail 83.5 mm.	culmen 20.5 mm.
venezuelensis	wing 112.0 mm.	tail 87.0 mm.	culmen 20.0 mm.
milleri	wing 105.0 mm.	tail 71.5 mm.	culmen 18.2 mm.
melanogyna	wing 114.0 mm.	tail 80.0 mm.	culmen 18.0 mm.

Geographic Range

Molothrus bonariensis has a far more extensive range than any of the other South American Cowbirds. It occurs from northern Patagonia north to northern Colombia, Venezuela, Guiana, Trinidad, and Tobago, covering the continent from east to west and about three quarters of its length from north to south. Inasmuch as the southern portion (Patagonia) of the continent is relatively very narrow, the area involved is less than its north and south dimensions would indicate. The range of the species takes in about 80 per cent of the whole continent, and there is not a single country in South America that is not inhabited, in part or whole, by *Molothrus bonariensis*. The bird occurs at sea level and at over 12,000 feet above the sea. As might be expected of a species with such an enormous range, considerable variation occurs and this, together with the variations in environment in different parts of the continent have given rise to a number of local races or supspecies.

The subspecific study of this species is still in a very unsatisfactory condition due to lack of comparative material from many parts of South America.

In fact, with all the data available it is still unsafe to do more than roughly indicate the distribution of the known subspecies. As time goes on and our knowledge increases, more races will undoubtedly be described and their respective ranges more definitely demarkated and those given here may be modified and restricted. The regions from which much more material is most needed are the Bolivian plateau, Matto Grosso, the eastern Andean ranges of Peru and Ecuador, the interior of Amazonia, and the highlands of Venezuela and the Guianas.

a. Molothrus bonariensis bonariensis

The range of the typical race of this Cowbird covers most of Argentina, including northern Patagonia, Uruguay, Paraguay, southern and central Brazil, skipping part of Matto Grosso, parts of Bolivia, and Chile. It is resident in all but the southern part of its range, being partly migratory as far north as Tucumán (where, however, the species is found all year round).

In Argentina it has been recorded from the following provinces—Missiones, Formosa, Chaco, Salta, Jujuy, Corrientes, Santiago del Estero, Tucumán, Catamarca, La Rioja, San Luis, Cordoba, Mendoza, Neuquen, Las Pampas, Entre Rios, Santa Fé, Buenos Aires, and Rio Negro and Chubut in Patagonia. In Patagonia it is much less common than further north and is only a summer resident, spending the winter further north. However it has been taken once as far south as the Straits of Magellan. (Cat Birds Brit. Mus. xi, 1886, p. 336.) It is commonest in cultivated districts and does not occur high up in the mountains. On the Tucumán-Catamarca frontier I noted this species at an elevation of about 4,000 feet, but not commonly, and not at all above that altitude. Further south, its range probably does not extend above the low foot hills, while northward it probably occurs much higher up in the mountains in suitable spots. However, it is chiefly a bird of the low country, both cultivated and pampas.

This race has recently extended its range into Chile but whether the extension was a natural one or brought about by human agency is an unsettled question. The older works on the avifauna of Chile do not mention the Cowbird as occurring in that country. Rafael Barros V. (1923, pp. 191-192) writes that this bird is definitely acclimatized in Chile and has been found in widely separated parts of the country.

Rahmer found it in Machali y Baños de Cauquenes; Reed in Limache. Prof. don Uldaricio Prado found it in great numbers in Talagante in 1916; and Barros found them at Los Andes in winter, spring, and summer, in Rauca, and on the coast of Curico, (Cutomo and Nilahue). At the last mentioned place Barros procured a young male beginning to molt in March, 1921. He writes that he never saw any Cowbirds above 1,000 meters elevation and is of the opinion that the species could not have crossed the Andean cordillera by natural means as the altitudes to be crossed would be too excessive. He records that between 1906 and 1914 large numbers were imported from Argentina as cage birds and suggests that the species got its present foothold in Chile by means of escaped cage birds. At present it is a resident species in the Chilian foothills, but is also casual or migratory for an altitudinal radius of several kilometers. Rahmer found that in dry years when there was little or no snow on the cordillera, the birds were commoner that otherwise.

In Boliva it ranges higher up in the mountains than in Chile or Argentina, but it must be remembered that this country is further north than the other two. Leo Miller (1917, p. 581) writes that at Pulque (between Sucre and the Rio Pilcomayo) it was not uncommon at 9,400 feet, but wherever he found this bird it was always ". . . . near more or less well-defined river valleys where there were cultivated fields and pastures." He collected specimens at Vinto, Mizque, and Rio Cachimayo, in Bolivia. Steinbach collected this species at 3,600 meters near Cochabamba. I have seen specimens of *bonariensis* from Cochabamba, Chuquisaca, Cordillera, Santa Cruz, Tarija and Sucre provinces. East of the Cordillera del Sunsas, eastern Santa Cruz, it intergrades with *milleri.*

In Paraguay, the form *bonariensis* occurs everywhere in suitable localities, always skipping the heavy forest areas. Its range extends north into Brazil but little is known definitely of the extent of its distribution.

In Brazil the range of *bonariensis* extends from Rio Grande do Sul, west to eastern Matto Grosso, north to the southern bank of the Amazon from the Colombian and Ecuadorian borders east to the Tapajóz, south along the eastern base of the eastern Andes to Bolivia in the west and southeast from the junction of the Amazon and the Tapajóz (Santarem) to southern Pernambuco in the east, thence south to the state of Espirito Santo, Minas Geraes, the valley of the Alta Parana, to Argentina, Paraguay, and Rio Grande do Sul. Along the valley of the Amazon typical *bonariensis* has been collected from Santarem (Tapajóz) west to Barba (Lower Madeira), Hyutanahan (Rio Purus), and the Rio Solimoes (Tonantins, and S. Paulo de Olivenca), the last named locality being close to the Colombian boundary. It is highly likely that this race also occurs in eastern Colombia and Ecuador. I know of no specimens from the north bank of the Amazon however.

In Uruguay the typical race of this cowbird is found commonly all over the country in suitable localities.

The race *maxillaris* Lafresnaye, is said to differ from *bonariensis* in having a stronger, higher, and longer bill with the maxillary tomium doubly curved, and constricted at the base. The range of *maxillaris* is the highlands of central Bolivia (prov. Cochabamba). I have examined a series of thirty-six *bonariensis* from Bolivia in the American Museum of Natural History and the Carnegie Museum and have compared them with the topotype of *maxillaris* in the Museum of Comparative Zoology. All of these birds are typical *bonariensis;* the basal constriction and lateral curvature of the maxillary tomium is not present. Therefore it seems that *maxillaris* is nothing but a deformed *bonariensis* and consequently becomes a synonym of the latter.

Type Locality—Buenos Aires

b. Molothrus bonariensis cabanisii.

Range. This large race occurs in Colombia from the eastern Andes west as far as the arid upper Dagua basin on the western slope of the western Andes and the valley of the Rio Atrato. The northernmost point at which *cabanisii* has been taken is Santa Marta on the north coast, and the most southerly locality is San Agustin, east of Cauca. In the Santa Marta region this bird is rare according to Todd and Carriker, but has been taken at San Martin, Arehueca, Cacagualito, and Fundacion; in the Magdalena district where it is said to be commoner, specimens have been collected at Aguachica, and Gamarra; in the province of Bolivar the bird is known from Lorica, Puerto Zapote, Jaraquiel, and Monteria; in Antioquia it has been collected at Sautata on the Rio Atrato, at Quibdo (the westernmost record so far), Medellin, Santa Elena, and Concordia; in the general region around Bogotá, it is known from Miraflores and Caldas; in northern Santander specimens have been collected at Ocaña; in the Tolima region the bird is definitely known from Cali, Yumbo, and San Antonio.

Chapman (Bull. Am. Mus. Nat. Hist., xxxvi, 1917, p. 631) lists this bird from only the tropical zone west of the eastern Andes. In the collections of the Carnegie Museum there are specimens from the subtropical zone as well. This race has been collected from sea level (as at Santa Marta) to at least 9,000 feet above the sea (Santa Elena). It is an inhabitant of the grassy, semi-arid parts of the tropical zone but in some localities it occurs up to the lower border of the cloud forests, as at Miraflores and San Antonio.

According to Dr. Chapman (loc. cit., p. 631) this race also occurs in western Venezuela (Merida, Puerto Cabello, and Maripa). The specimens from these localities are usually referred to the form *venezuelensis,* but Dr. Chapman concluded that they were intergrades between *cabanisii* and *minimus,* but much nearer to *cabanisii* in size, and therefore referable to that form. However, the form *venezuelensis* is nothing but a race intermediate in size, as well as in geographic range, between *cabanisii* and *minimus,* and it is to this race that the Merida, Puerto Cabello, and Maripa specimens should be referred.

The race *cabanisii* is sometimes included in lists of European birds because of an escaped cage bird recorded by Gätke at Heligoland, and one author has even figured its egg in an illustrated work on European oölogy!

Type Locality—Santa Marta

c. *Molothrus bonariensis venezuelensis.*

Range. This race occurs in the tropical zone of Venezuela from the Cordillera de Merida (Merida, and Tabay) eastwards through the province of Lara (Guarico, Tocuyo, and Anzoategui) to San German de Upata. Northwards its range extends to Carabobo, El Trompillo, and Puerto Cabello. The southern limits of its range are very uncertain but probably coincide with the southern limit of more or less open country north of the Amazonian forests. In eastern Venezuela it intergrades slightly with *minimus.*

Type Locality—Venezuela

d. *Molothrus bonariensis aequatorialis.*

Range. According to Chapman (loc. cit., p. 631, and 1926, p. 697) this race occurs in the Colombian-Pacific fauna of the tropical zone of southwest Colombia (not known from north of the Patia River) southward across western Ecuador.

In Colombia it has been taken at Barbacoas and at Tumaco, in both of which localities it was breeding. The two localities are quite unlike ecologically, Tumaco being described as dry, sunny, and sandy, with only stunted vegetation, and on one side, some mangroves, while Barbacoas is said to be surrounded by thick forest and impenetrable jungle.

In Ecuador this race occurs along the coastal regions only (Esmeraldas, Yaguachi, Choné, Manta, Daule, and Puná Island).

The range of this race seems to extend northwards along the west coast to Colombia to southern Panama. A single, juvenal bird (A.M.N.H. 136758) from Boca de Cupe, Tuyra River, Darien, seems to belong to this subspecies.

Type Locality—Barbacoas, Colombia

e. *Molothrus bonariensis occidentalis.*

Range. Western Peru and southwestern Ecuador. As far as I know the only specimens taken in Ecuador were collected in the Casanga valley, where a series of nine were obtained. It is a bird of the arid tropical zone.

Type Locality—Lima, Peru

f. *Molothrus bonariensis milleri.*

Range. Brazil, Matto Grosso; Corumba, Descalvados, Cuyabá; Bolivia, Puerto Suarez. In the eastern part of the province of Santa Cruz, Bolivia, it intergrades with typical *bonariensis.*

Type Locality—Urucum, near Corumbá, Matto Grosso, Brazil.

g. *Molothrus bonariensis melanogyna.*

Range. Southeastern Brazil, provinces of Rio de Janeiro (La Raiz, Organ Mountains, Serra de Itatiayá Campo do Jordao) and Paraná (Invernadinhas). Intermediates between this race and typical *bonariensis* occur in Rio Grande do Sul, Brazil; Puerto Pinasco, Paraguay, and in Missiones, northeastern Argentina.

Type Locality—Inveradinhas, Paraná, Brazil

h. *Molothrus bonariensis minimus.*

Range. Northeastern Brazil (states of Ceará, Maranhao, and Pará), the Guianas, northeastern Venezuela (the Orinoco delta); Trinidad, Tobago, Grenadines (Curaçao); Lesser Antilles, Vieque (near St. Thomas); Greater Antilles (introduced ?); and Barbadoes (introduced).

Chapman (1917, p. 631) records a specimen from La Morelia, Colombia. This is the only Colombian record as far as I know and it does not seem too well established. The specimen in question is an immature male with the following measurements—wing 101; tail 75; tarsus 25.7; and culmen 18 mm. Of a long series of *adult* males from various parts of the range of the race only one had a wing of 100 mm., while the rest had wings of from 94-98 mm. It is not very likely that the La Morelia bird is *minimus,* but probably is an intergrade between *cabanisii* and *bonariensis.*

Stone (1891, pp. 344-347) gives Venezuela, Guiana, and Trinidad as the range of *minimus,* while Newton (1861, p. 308) records a specimen from Bisque, Virgin Islands. It has been recorded in British Guiana by Beebe and others, in Surinam by the brothers Penard, and in French Guiana it has been taken by Klages (Cayenne and Mana) and others. Lowe (Ibis 1909, p. 312) writes that it is rapidly establishing itself in the southern end of Grenada. Leotaud writes that it is common in Trinidad, and Wood (1923, pp. 128-129) records it as a recently introduced species in Barbadoes.

Type Locality—British Guiana

MIGRATION

Review of the Literature

Aplin (1894, p. 172) writes that although the Shiny Cowbird is a resident, ". . . . it is possible that a partial migration takes place, as Mr. Burgess told me the flocks decreased after getting to a certain pitch as winter came on. They were certainly not so large as they had been when I left at the end of May."

The only other published reference to the migratory habit in the Shiny

Cowbird that I know of is a statement of Hudson's (1920, p. 73) that, "In Buenos Ayres. . . . .they have a migration, which is only partial, however. It is noticeable chiefly in the autumn, and varies greatly in different years. In some seasons it is very marked, when for many days in February and March the birds are seen traveling northward, flocks succeeding flocks all day long, passing by with a swift, low, undulating flight, their wings producing a soft musical sound; and this humming flight of the migrating Cowbirds is as familiar to everyone acquainted with nature in Buenos Ayres as the whistling of the wind or the distant lowing of cattle."

Both these notes obviously refer to the autumnal migration, as the seasons and directions of migratory flight in Argentina are exactly opposite to those in North America. Of the spring migration nothing seems to have been published.

Migration of the Shiny Cowbird

On September 21, 1923, while traveling on the Central Argentine Railway from Buenos Aires to Tucuman I saw many thousands of this Cowbird from the train window. Some single flocks near Santa Fe contained at least five thousand birds, probably all, or almost all, of this species. One large flock of about four thousand birds was flying along at an elevation of about two hundred feet, the flock formation being long and narrow with its long axis in the direction of flight.

September 22, 1923, Tucumán. I noticed that the Cowbirds were in large flocks in which there were either equal numbers of the two sexes or the females slightly outnumbered the males. This being so contrary to what I had expected, judging by accounts of the sex ratio of this bird, I immediately suspected that I was in the midst of the spring migration and that while the resident adult males and females were all present the migrant adult males had probably largely gone on farther south and the incoming hordes of migrant females were responsible for the reversal of the usual sex ratio. If this be true then the next few weeks should show; first, an increase of the number of females to males, then a decrease and finally another large flight of the year old birds before the normal status would be reached.

September 25, 1923, Concepción, Tucumán. This morning I saw many flocks. Three flocks were practically all females, about fifty females to one male. In the other flocks the sexes were fairly even. Can these flocks of females be migrants just arrived?

September 26, 1923. M. bonariensis abundant everywhere; many of the flocks are composed entirely of females; while some flocks have ten males to one female. I shot several of the males from these flocks and every one showed some juvenal feathers so it seems the year-old males are beginning to pass through.

October 2. Common everywhere. There is still a partial separation of the sexes but the number of females is much less than a week ago. In one field there were about three hundred males and only twenty-five females, while in another there were about one hundred males and one hundred and fifty females.

October 3. Collected six females of which four were still molting, particularly on the nape. Are these year old birds? I saw many flocks in some of which males predominated, in others females were most numerous. One flock contained only females, about a hundred in all.

October 7. Abundant everywhere. Females still predominating in most flocks.

October 10. The ratio of females to males is now about three to two as against five or more to one ten days ago.

October 19. Abundant everywhere. Some flocks are ninety per cent male (mostly year old birds), while others are about seventy-five per cent female. On the whole the sexes are about even in numbers. Aside from the large flocks, which are obviously migrating birds, most of the Shiny Cowbirds are now in pairs, or, at most, in groups of threes, two males and one female. In the large flocks of course there is no indication of pairing, even when the flocks scatter at my approach.

October 24. Abundant everywhere. In the flocks there are surprisingly few birds displaying.

October 30. No large flocks anymore. I have not seen any for at least two days now. The year-old males too are all gone. Apparently migration is over, and it is time as it is nearly a week ago that I found the first eggs of this Cowbird here.

I have taken the above notes directly from my field book to show exactly what observational data I had to work with. In addition to this I trapped altogether some twenty individuals of both sexes and banded them conspicuously with bright red and yellow bands, noting at the time the color and number of bands and on which leg they were. All these individuals thus trapped and banded were from large flocks. In most cases I saw the birds for the rest of the day but the next day they were gone while in a few instances I noted certain ones around for a few days and then no more. One in particular, a year old male with a red band on the right leg and a red and a yellow band (red uppermost) on the left leg stayed in the field where I banded it for three days and then disappeared. This all indicates that the birds in flocks were migrants. Now, working backwards from all the evidence given above it seems that my initial surmise on arrival in Tucumán was correct. The Shiny Cowbird is a permanent resident there and undoubtedly, as the season then corresponded roughly to early April in the latitude of Washington, the resident, i.e. local breeding birds were all there before my arrival. The majority of the migrant adult males had passed on to the south, as the ratio of males to females dropped in the next few days, while the migrant adult females were passing through in force. By September 26 the first year old males put in their appearance.

I may say at this point that although, as in *M. ater*, the year old male *M. bonariensis* resembles the adults of its sex, nine out of ten retain some of the juvenal plumage, often enough to distinguish in the field. By the end of October they were all gone. I had no certain method of distinguishing between year old females and older ones but, judging by the migration of *M. ater* they probably came slightly after the young males.

Summary of Spring migration at Concepción, Tucumán, in 1923.
Migrant adult males—all gone before September 22.
Migrant adult females—early September—October 10.
Resident adult males—all arrived before September 22.
Resident adult females—all arrived before September 22.
Year-old males—September 26—October 28.
Year-old females—September 30—October 28.

In taking into account the dates for resident adult birds it should be remembered that it is barely possible that they may winter on their breeding grounds and so have no (or practically no) migration.

In every case when I collected resident birds, i.e. birds seen in pairs or threes, and also migrants out of flocks, on the same day or within a few days of each other, the gonads of the resident birds were larger and better developed than those of the migrants. There also was a slight difference in the stomach contents, the resident individuals eating relatively more insect food and the migrants subsiding on seeds to a greater degree. As the season wore on, i.e., towards the middle of October, this difference became more marked.

The Shiny Cowbird migrates chiefly late in the afternoon and early in the morning and differs from the Cowbird of North America in that it is not especially partial to marshes during its migration. It associates with several other species in its migration, notably with *Agelaius ruficapillus* and, in marshy regions, with *Amblyrhamphus holosericeus* and to a lesser extent, *Agelaius thilius*. During the day the birds gather in large numbers around horses and cattle and in such places they are often found feeding together with the little Picui Doves (*Columbula picui*) which are so abundant throughout Argentina.

In all probability, the more northern races of *Molothus bonariensis* such as *occidentalis, cabanisii, minimus,* and *venezuelensis,* have no real migration. In the case of birds of the high Bolivian plateau there may be an altitudinal migration.

Summary of Migration

1. *M. bonariensis* is a permanent resident in most of its range but there is a definite migration in Argentina.
2. The species migrates in large flocks, often containing many thousands of individuals.
3. In Tucuman where the bird is a permanent resident the migration is definite and has the following characteristics:
    a. The migrants precede the residents
    b. The adults precede the young

c. The males precede the females in each class

d. The dates for the spring of 1923 at Concepción are as follows:

Migrant adult males—all gone before September 22
Migrant adult females—early September—October 28
Resident adult males—all arrived before September 22
Resident adult females—all arrived before September 22
Year old males—September 26—October 28
Year old females—September 30 (approximately)—October 28.

4. Resident birds have the gonads further developed then do migrants of the same date and locality.

5. Resident birds feed somewhat more on insect food and less on seeds than do migrants.

6. This species does not roost in marshes at night as does *M. ater* but prefers open dry uplands and roosts in trees.

7. During migration it associates with *Agelaius ruficapillus, Agelaius thilus,* and *Amblyrhamphus holosericeus* in flight, and largely with *Columbula picui* when feeding.

8. The migration takes place chiefly in the late afternoon and very early morning.

Courting and Mating

Review of the Literature

The earliest account that has come to my notice is the brief description of this bird's habits given by Azara, (1802-1805, I. pp. 275-281), who writes that the birds show off their plumage, raising and lowering their tails while giving their notes. He believes that the notes are common to both sexes and that there are two types, the first sonorous and written by him as *pliquen* (in English pronounced *pleeken*), and the other low and deep and syllabilized as *gru gru gru.*

Hudson (1920, p. 72) gives the best account, as follows: "The song of the male, particularly when making love, is accompanied with gestures and actions somewhat like those of the domestic Pigeon. He swells himself out, beating the ground with his wings, and uttering a series of internal notes, followed by others loud and clear, and occasionally when uttering them, he suddenly takes wing and flies directly from the female to a distance of fifty yards, and performs a wide circuit about her in the air, singing all the time.

"The homely object of his short-lived passion appears utterly indifferent to this curious and pretty performance."

Gibson (1880, pp. 14-16), describes the notes of this Cowbird as " . . . . a peculiar gurgle, as if it had water in its throat."

Hussey (Auk, 1916, p. 399), in writing of this bird at La Plata says that it, " .. . . .has quite an attractive little song which it delivers with much display; and at times the bird is so carried away by his emotion that he takes to the air and flies about singing all the time."

Courtship Habits of the Shiny Cowbird

The Shiny Cowbird has three types of display as does also the North American species—terrestrial, arboreal, and aerial—but while the arboreal is the type most commonly indulged in by *Molothrus ater* (at least in the northeastern states), the terrestrial form is the one most used by *Molothrus bonariensis.*

My first introduction to the terrestrial display of this species took place near the city of La Plata on September 12, 1923. Several males were noted in a tree with some females when they all suddenly flew down to the ground. Immediately one of the males ruffled up the feathers of its head and body, slightly arched its wings and dropped its tail just a trifle and then gave three guttural purring notes in rapid succession, visibly shaking the body with each note as though considerable effort was required to emit it. The notes may be written *purrr, purrr, purrr.* The bird did not bow or bend forward at all. Very apparently this was not a complete display. For nearly a month in all parts of Argentina where I happened to be I saw only incomplete displays of this kind and it was not until October 8 in the province of Tucumán that I observed the full courtship display. The fact that all displaying done very early in the spring (September), was incomplete is of interest, although probably some birds gave full displays during this time. The complete terrestrial display is as follows:

The male runs a little ahead of the female, fluffs out all his feathers, arches his wings two-thirds of the way to horizontal, bends down his head and then rapidly beats his wings three or four times. If the female should happen to turn away, the male would jump to a new position maintaining the same attitude during the jump. While it is ruffling its feathers and arching its wings the male bird utters three gutteral purring notes *purrr purrr purrr.* Often it beats the ground rapidly with its wings as it gives three three notes. Now bending its head it sings in a thin, high, glassy, squeaky voice *pe-tsss-tseeeee* much like the song of the North American Cowbird. On several occasions that I have observed where the displaying male was apparently very passionate it flew up suddenly as it began to sing these glassy notes as if unable to restrain itself, and circled around the female two or three times singing as it flew, after which it usually sailed with stiff, arched wings, Starling-fashion, to a fence post or other perch anywhere from ten to thirty feet away. Even in these cases of unusually energetic displays the females seemed disinterested, but as soon as they were over, flew to the perches where their respective males were.

Frequently when first approaching a female, particularly if another male is near, the Shiny Cowbird points its bill straight up and holds the pose for a few seconds before beginning its display.

The aerial type of display is seldom used and when it is indulged in, is very incomplete while the song is given fully. On several occasions I noted males fluffing out their body feathers while flying, and beginning to sing while ruffling their feathers. On one occasion a male even attempted to arch its wings with the result that it flew very stiffly for a few wing beats when it once more resumed its normal flight.

The arboreal display is similar to the terrestrial type except that the wings do not beat against anything but merely fan the air, and that the bird bows over more than when displaying on the ground. At its fullest extent the bowing forward is carried only half as far as in the display of the North American species, i. e. not quite to a horizontal position. When displaying in the trees the Shiny Cowbird is rather restless and usually changes its perch between displays. This is quite in contrast to the North American bird of which I have seen individuals display for half an hour or more without moving a foot. *Molothrus bonariensis* uses the arboreal display frequently but by no means as commonly as the terrestrial. The bird is very terrestrial in all its ways, even more so than *Molothrus ater.*

An unusual variation of the orboreal display was observed in Tucumán, northwestern Argentina, towards the end of September. A male was chasing a female and the latter flew on to a fence post. The male then lit on the fence wire about three feet from the post, fluffed out all his body and head feathers, bent his tail forward and under, and arched his wings to nearly a horizontal position. Then he bent forward very slightly and suddenly jumped up into the air and lit on the same wire about ten inches nearer the female than before. No sooner had he touched the wire than he bounced up again coming down just about a foot nearer the female. Again he bounced up and landed very close to her when she flew off and he followed. During the entire performance he maintained the same position that he assumed before the first bounce. Each jump was accompanied by a guttural but somewhat liquid *purrr* sound. This *purrr* note had a quality like that of the purring of a cat but there was a suggestion of bubbling water as if the cat was purring under water,—a most unnatural thing for a cat to do.

On a few occasions I observed males of this Cowbird displaying to birds of other species,—once to a Bay-winged Cowbird, once to a Screaming Cowbird, and once to a "zorzal negro" (*Semimerula fuscatra amœna*). Several times I saw males displaying to other males or sometimes even to empty spaces, but in these instances the displays were usually, but not always, not very complete. This Cowbird displays much less than does its North American congener and while it begins to display early in September the courtship season is well on the decline by the middle of November and after the first week of December the full display is not given. In fact the complete display is rarely given after the middle of November and not commonly before the beginning of October. At least such has been my experience; as related above I saw no full displays in the spring until the eighth of October, although probably some were given. Judging by some of the very early egg records of Hudson's near Buenos Aires it seems that some individuals may begin their courtship season early in September, but from my personal experience with the birds and from all writers other than Hudson, I should say that such cases are exceptional.

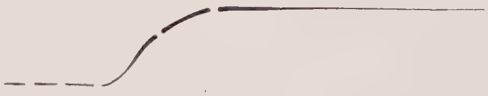
Song and Call-Notes

Although song and call-notes are closely bound together in the life of the bird and should therefore be treated as one subject, each distinct type of vocal utterance requires separate discussion if any interpretation of their respective meanings is to be arrived at.

The true courtship song is naturally confined to the male and is indulged in from early September regularly until early December and occasionally a little later. However the song of the bird becomes less common in early November and from then on declines until in late November and the beginning of December it is scarcely ever heard. It varies considerably, and, in my experience, is never indulged in to the same extravagant degree that is so noticeable with the Cowbird of North America.

The courtship song of the Shiny Cowbird begins rather indefinitely, well down in the throat and the first sounds are of a curious combination of *purring* and *bubbling*. Three of these guttural notes are belched forth by the bird with considerable bodily quivering, and sound as though they were forced up through water. They are all alike and may be written *purrr purrr purrr* but the rrs are softened so that the bubbling sound is produced. Closely following these notes come three high, rather glassy, thin notes, the first two short and somewhat run together, and the last one long and drawn out—*pe-tsss-tseeeee* very much like those of *M. ater*, but very slightly buzzier, or, to put it the other way, the notes of the North American species are just a trifle clearer than the notes of the present bird. So then the entire song may be written as follows: *purrr-*

purrr-purrr-pe-tsss-tseeeee, or to represent it diagrammatically and indicate the changes in pitch,



The last long drawn out note becomes thinner towards the end and ends, not abruptly, but merely by dying out. The entire song lasts about 3 seconds. A common type of variation is that in which the second of the three squeaky notes is omitted. The song generally becomes incomplete towards the middle of November when frequently the three guttural notes are left out and the last note is much shorter and weaker.

The male also has another song which is not to be considered as the "true" song of the species inasmuch as it is not a courtship song. I never heard it given with the full display. This I have termed the "twitter" song because it sounds more or less like the twittering of some finches such as the Goldfinch in North America or the *Spinus icterica* in Argentina. How widespread this type of song is I cannot say as I heard it only in the Province of Buenos Aires and Tucumán, but as these two localities are about nine hundred miles apart, the logical inference is that it is used in the intervening area and probably elsewhere as well. It consists of three short but distinct notes followed by a twitter of from six to eight, and sometimes even nine syllables, the syllables of the twitter being more or less run together. The three short notes probably correspond to the three guttural notes of the true courtship song, but are not throaty in quality. These three notes are sometimes omitted, just as occasionally happens in the courtship song.

The call notes are of four kinds. One of these is practically restricted to the female, one to the male, and the other two are used by both.

The first of these, the "rattle," is used very commonly by the female and only very rarely have I heard (or seen) a male give this call. This rattle call is a rapid, rattling chatter much like that of the female of *M. ater* but slightly more metalic in nature, the individual notes have a suggestion of a click to them, and, as in the North American bird, all the notes are much run together. The female usually gives this call as she starts to fly, but sometimes gives it while in full flight and occasionally while on the ground or in a tree. On several occasions I heard this rattling call from male birds in trees but on all but one occasion the rattle was shorter than in the female and was followed by the next type of call note, a clear, plaintive, glassy whistle *pseeee.*

The second type of call, apparently entirely confined to the male, is a long drawn-out, plaintive whistle, corresponding to the flight whistle of the male Cowbird of North America or the plaintive whistle of the male *Amblyrhamphus holosericeus* of South America. However in the case of the Shiny Cowbird this note is not particularly a flight call and is seldom given alone. It is usually preceded by a *chuck* note and often this plaintive *pseeeee* note, high, clear, thin, and glassy, is repeated once or twice. On the few occasions when I heard male birds give the rattle call described above they followed it (with one exception) with this call.

The third type of call note is the *chuck* note. This is given by both sexes and is very commonly used. In this connection it is of interest to remember that in *M. ater* this note is used rather sparingly. However, in the latter species this is a *feeding* note while in *M. bonariensis* it seems to be a note of general utility. Birds of both sexes were frequently seen perching in trees, not feeding at the time, and, as they perched there, were giving this *chuck* note very commonly. One male repeated this *chuck* note about twenty times in rapid succession, giving an impression much like that of the rattle call.

The fourth type is what I have termed the *battle call* because I have never heard it except from birds engaged in fighting. It is probably merely the same as the ordinary *chuck* call but given under great excitement and physical exertion. It is much harsher and more grating than the ordinary *chuck* note and while it is usually rapidly repeated, each note is more drawn-out than in the case of the normal *chuck*. On one occasion I saw two males fighting over a bit of food. They flew up from the ground to a height of about three feet, striking each other with their wings and uttering a harsh chucking noise. The whole thing lasted but a few seconds when both began to eat again on the same spot where they were in the beginning. I heard this note many times from male birds and only once from a female. In the last case the female was trying to drive away another female from the spot where the former was feeding.

Sexual and Territorial Relations

Review of the Literature

Hudson (1920 p. 71) after commenting on the fact that there are more males than females in this species, says that, "The Cowbirds are sociable to a greater degree than most species, their companies not breaking up during the laying season; for, as they are parasitical, the female merely steals away to drop her egg in any nest she can find, after which she returns to the flock." A few pages later he says that the Cowbirds, " . . . . being gregarious and practising promiscuously sexual intercourse, must lay a much greater number of eggs than other species."

Rahmer (1912, pp. 207-209) writes that this bird is polyandrous, each female being mated to five or six males. Other writers make casual references to this Cowbird as a promiscuous or polyandrous species but none go into any detail.

The Sexual and Territorial Relations of the Shiny Cowbird

Señor Venturi informs me that near his house at Tucumán in the spring and summer of 1923 (September to end of the year) there was a male *Molothrus bonariensis* which was easily identified among others of its kind by a defect in one wing. Señor Venturi watched this bird and found that it was apparently mated to two females. This is the only case of true polygamy I have heard of in this species.

In the course of my field work I watched great numbers of breeding males and found that the majority were apparently monogamous, i. e. I saw more birds in pairs than in any other numerical combination. In a few cases I noted two males were apparently mated to the same female and once I found three males in attendance on one female for two consecutive days in the same spot. I found that during the spring and early summer the birds in flocks were all migrant birds while the breeding individuals were mostly in pairs. However, in localities where the birds are particularly abundant their relations are much looser and tend towards polyandry as indicated more fully below.

In this species the factors influencing the extent of the breeding territory are not those associated directly with the food supply but with the abundance of nests in which to deposit their eggs. Consequently the size of the territory varies inversely with the number of available nests. The denser the small bird population, the smaller the territory of each Cowbird.

To get a true picture of the sexual and territorial relations of the Cowbird it is necessary to study the birds in a district where they are not too numerous because in localities where the species is exceedingly abundant the territories as such become almost impossible of definition and demarkation. This is so because the sexual relations of the *M. bonariensis* are easily overridden by the pressure of Cowbird population. In this connection it should be borne in mind that the Cowbirds are most numerous around cultivated districts and that, as Hudson so aptly expressed it,—"The altered conditions have in various ways served to remove many extraneous checks on the parasitical instinct, and the more the birds multiply the more irregular and disordered does the instinct necessarily become. In wild districts where it was formed, and where birds building accessible nests are proportionately fewer, the instinct seems different from what it does in cultivated districts."

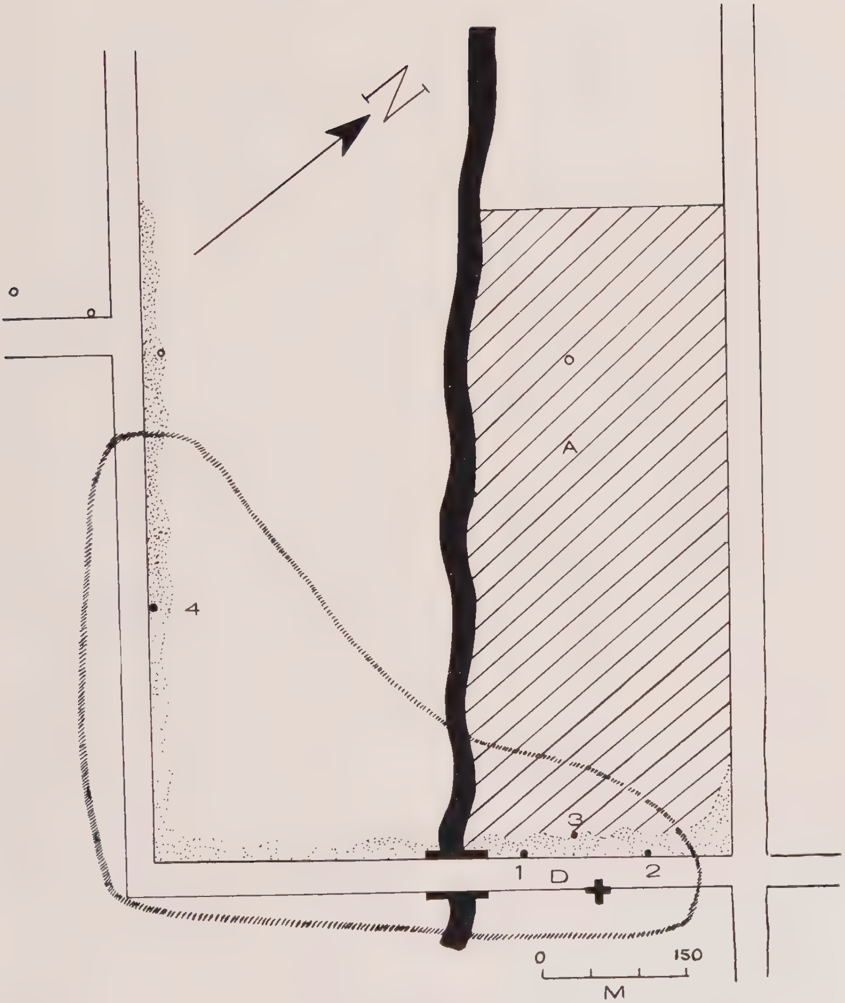


FIG. 5.

BREEDING TERRITORY OF A PAIR OF SHINY COWBIRDS.

The cross indicates the singing tree of the male.
D.—Dusting place of the Cowbirds.
1, 2, 3, and 4—nests in which the female Cowbird laid eggs.
The scale is in meters.

Around Concepción, Tucumán, there is an extensive area under cultivation, chiefly of sugar cane. However this cultivated area stops in one direction just a couple of miles away and is interrupted by a considerable stretch of wild bushy country. The Shiny Cowbird is abundant around the farms and fields and becomes slightly less numerous, but is still very common, in the bushy district, and its territories a little more easily studied there. At one edge of an alfalfa patch which terminated the cultivated area in that direction I was fortunate enough to find that but a single male Cowbird had taken up his abode and after some days I noted that he had secured a mate. A little stream separated the alfalfa field from an uncultivated bushy field which, except for the intervention of a dirt road, stretched away into wilder bushy country. Along the edge of the road was an overgrown ditch in which numbers of the Chingolo Song Sparrow, *Brachyspiza capensis* were nesting. The male Cowbird chose as a "singing tree" a high bush just across the road and I saw him there day after day. He and his mate used to dust themselves in the road close to that spot and although I saw them together dozens of times I never saw a third bird join them.

In the accompanying map (Text Fig. 5) I have tried to present graphically the substance of what I wish say. The area enclosed by the hatched black line is roughly the territory of the male Shiny Cowbird whose "singing tree" is indicated by a vertical cross (+). The place where I observed the male and his mate dusting themselves in the road is indicated by the letter "D". As the season wore on I watched them part of each day and found the first egg on October 25 in a nest of a Chingolo. I was surpised, however, to find that another female Cowbird also laid in this nest on the same date. It looked as though the male was constant in its territorial relations but that females came and went promiscuosly. The nest referred to is marked 1 on the map. However, I kept up my daily observations, and in the next few days found that the same female had laid an egg in each of four Chingolo nests in this territory, including nest No. 1. The eggs were laid at intervals of one day, but at the same time each day I kept finding eggs of other female Cowbirds in nests where they were not the day before. Thus in nest 1 no less than four different female Cowbirds deposited one egg each, two of them removing (or apparently removing) one of the eggs already in the nest. In the nest No. 2, eggs were deposited by two different Cowbirds; nest No. 3 contained eggs of two different Cowbirds; nest No. 4 contained only 1 Cowbird egg. All-in-all I judged, by the size, color, markings, and texture of the eggs as well as by the date of deposition that no less than six different females had deposited eggs in nests within the limits of this particular territory. There were undoubtedly more nests there which I did not find. However, the important point is that, one bird which I call the real mate of the male whose territory is under discussion, layed an egg in each of the four nests, or 4 eggs in all, while of the other five females using these nests, four layed but one egg a piece and the other laid two. Furthermore the two eggs laid by the last bird were laid four days apart. This means either that this particular female wandered about from one territory to another or else that it layed during the interval in nests in this territory which I never found.[1] The former is the more likely.

Nevertheless, in spite of all these confusing data it seems that the Shiny Cowbird is chiefly monogamous and each mated female sticks to one territory, but that both the sexual and territorial relations are so weak as to be very easily modified or sometimes even destroyed by conditions, particularly by the unnatual, increased density of molothrine population per given area around cultivated districts. Of course this frequently results in what seems to be sexual promiscuity and does destroy, in great measure, the "territory," in the sense that that particular area is no longer the domain of only one female but has become the happy hunting ground of all that may care to make use of it. The same is largely true for the North American species, *M. ater*.

In fact Barrows, (Bull. N. O. C. 1883 p. 133-134) than whom no more reliable observer ever wrote on Argentine birds, said that he was inclined to think that *Molothrus bonariensis* differed less from *M. ater* in its habits than was generally supposed. "Its great abundance and the comparative openness of the country will in great measure account for the large number of eggs found as well as for the numbers sometimes observed in single nests. . . . . Of course this overdoes the matter so as to compel the rightful owner to desert the nest, but I suspect that our own Cowbird would be no wiser under similar pressure."

One more point needs to be discussed here. The males outnumber the females to the same extent as they do in *M. ater* of North America,—about 3 males to every 2 females. Assuming that every breeding female has a mate and but one mate, there would be still one-third of the males without mates and consequently without any means of satisfying their sexual desires. If the males had no "territories" or "spheres of influence" and several joined in the pursuit of each female, disaster to the race would undoubtedly ensue. But each male (except in the case of the yearling birds that come in very late) has his own territory and there he awaits the coming of a mate. The greater the number of Cowbirds to a given area, the greater is the competition for territories with the result that the territories are smaller than elsewhere where the Cowbirds are fewer. The smaller each territory, the less assurance a female has of a requisite number of nests in which to lay, and so what probably happens is this: after utilizing all the available nests in the territory of any one male she passes on to that of the next. If that territory is already occupied by a female, the newcomer finds the available nest supply inadequate and passes on still further afield. Often she may leave an egg or even two in a certain territory before passing on. Inasmuch as there are at least fifty per cent more males than females, it means that after each female has exhausted the "territory" of her particular male she still has half as much more coming to her in other places. This arrangement not only gives all the females a fairly equal chance to lay the maximum number of eggs but it also brings about a state of affairs wherein each male can find satisfaction in the appeasement of its sexual desire. However, this state of affairs can hardly be called polyandry for, although in the course of a season each female may have several mates, she has only one at a time and only one in a territory. Most monogamous birds change mates with each brood and yet no one would call the females polyandrous, the males polygamous or the species promiscuous. In the Cowbirds, if the birds were originally more than one brooded, the broods have been merged in adaptation to the parasitic habit. One would be more justified in calling the males polygamous as they have intercourse with some of the wandering females while still mated themselves. Yet the male does not leave his territory to collect a harem but takes what comes his way, and not having any concept of parental instinct can hardly be accused of polygamy. There is a great difference between this and a non-parasitic species wherein the male has a paternal interest in two nests simultaneously.

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[1] In this connection I should advise any reader interested particularly in this subject to study the observations of Mr. E. P. Chance on the European Cuckoo *Cuculus canorus*, and acquaint themselves with his theory of a "dominant" female in each territory, an explanation with which my observations on *Molothrus* are in complete agreement, keeping in mind the sole difference that the Cowbirds lack specificity in their parasitism.

In fact if the females did not wander further afield after exhausting the possibilities of the territories of their respective mates, at least one-third of the males would not be able to appease their sexual desires without forsaking their territories and intruding into those of other males. The loyalty of each male to his territory is not to be thought of as "virtuous" in any way, but is due to the fact that he would have nothing to gain by wandering. It might almost be said of the male Shiny Cowbird that—

> His honour rooted in dishonour stood,
> And faith unfaithful kept him falsely true.

So, then, it seems that the Shiny Cowbird is monogamous, under normal conditions, but where artificial conditions have caused a great, unnatural increase of the species, the inherent instinct is not strong enough to stand unmodified against the increased competition and frequently is modified so extensively as to belie its original status.

THE NEST-BUILDING INSTINCT

This species is entirely parasitical in its breeding habits, but of all the species of Cowbirds practicing parasitism, it has the habit in the earliest and least perfected stage. It has, however, completely jumped the gap between the reproductive manner of the Bay-winged Cowbird and the parasitic custom of its other congeners but it has apparently not progressed farther up the bank of parasitism, not gone farther from the gap it has jumped, since it first landed on that side. Consequently we may well inquire if it still possesses any ragged remnants of its former "respectability" taken with it in its leap, accidentally or otherwise.

Hudson made numerous notes on the interest in nests displayed by not only the females but also the males of the Shiny Cowbird even considerably before their breeding season had commenced. I noticed the same thing many times both very early in spring and also in the autumn after the Cowbirds were through breeding. Time after time I saw birds of this species (both sexes) walking over and examining nests of Ovenbirds (*Furnarius*) and Woodhewers (*Anumbius, Synallaxis,* etc.), without actually entering them. As Hudson wrote, ". . . . Before and during the breeding season the females, sometimes accompanied by the males, are seen continually haunting and examining the domed nests of some of the *Dendrocolaptidæ.* This does not seem like a mere freak of curiosity, but their persistence in their investigations is precisely like that of birds that habitually make choice of such breeding places. . . . Whenever I set boxes up in my trees the female Cowbirds were the first to visit them. Sometimes one will spend half a day loitering about and inspecting a box repeatedly climbing round and over it and always ending at the entrance, into which she peers curiously, and when about to enter starting back as if scared at the obscurity within; but after retiring a little space she will return again and again as if fascinated with the comfort and security of such an abode. It is amusing to see how pertinaciously they hang about the ovens of the Ovenbirds, apparently determined to take possession of them, flying back after a hundred repulses, and yet not entering them when they have the opportunity. Sometimes one is seen following a wren to its nest beneath the eaves, and then clinging to the wall beneath the hole into which it disappeared. I could fill many pages with instances of this habit of *M. bonariensis*, which useless though it be, is as strong an affection as the bird possesses. That it is a recurrence to a long disused habit I can scarcely doubt; at least to no other cause that I can imagine can it be attributed; and, besides, it seems to me that if *M. bonariensis* when once a nest-builder, had acquired the semiparasitical habit of breeding in domed nests of other birds, such a habit might conduce to the formation of the instinct which it now possesses. I may mention that twice I have seen birds of this species attempting to build nests, and that on both occasions they failed to complete the work. So universal is the nest-making instinct that one might safely say the *M. bonariensis* had once possessed it, and that in the cases I have mentioned it was a recurrence, too weak to be efficient, to that ancestral habit."

If we remember that in the case of the Bay-winged Cowbird, the birds prefer the nests of Woodhewers and Ovenbirds to any other and that they build for themselves only as a last resource although they still possess the nest-building instinct, the interest shown by the *M. bonariensis* in such structures is obviously nothing but a tattered fragment of its ancestral habit, one of the ragged remnants of its former respectability. The fact that the male exhibits this interest as well as the female is a further argument in favor of this, as in the Bay-wing both sexes fight equally for the possession of nests or share in the labor of constructing them. Except on the basis of hereditary phylogenetic inclination how could we explain the male's interest in nests? In the Bay-wings the nest captured determines the actual location of the breeding territory, but we cannot, therefore, assume that interest in similar nests in the case of the Shiny Cowbird is to be interpreted as a manifestation of territorial desire because usually no or little use is made of them afterwards. In the majority of cases these nests are of only passing interest to the Cowbirds.

The statement of Hudson's quoted above to the effect that he has known birds of the present species to attempt to build nests on two occasions is of real importance as it shows unmistakable evidence of a weak, inefficient recurrence of an ancestral habit. The only other pertinent evidence on this point comes from Page's observations on this species in captivity. He writes (Avicultural Mag. 1905 pp. 137-141) that he had a pair of these Cowbirds in his aviary and that the female "bullied" the male, pulling out feathers from the lores and forehead. ". . . . After about a month of this bickering, they patched up their differences and began courting again. Shortly after I found she had built a nest (I saw her finishing it, the male supplying material and looking on) in a large log provided for my Cockateels, putting in for a foundation small tufts of grass with earth attached, arranging on the top of this a loose structure of small sticks and bents similar to that of our Starling; no eggs were laid."

So then, the Shiny Cowbird does on rare occasions experience a slight recurrence to an ancestral instinct, although normally it does not do any nest building.

Eggs and Egg-Laying

Review of the Literature

Euler (1867, pp. 415-417) describes two varieties of eggs of the Shiny Cowbird in the vicinity of Cantagallo, Brazil. One was oval in shape, slightly longish, the small end not at all pointed, measured 24 mm. x 19 mm.; color reddish but the ground color white with bright reddish blotches and pale violet and bright brown flecks and dots. The other was more spherical, 21½ mm. x 18 mm. Ground color whitish green with yellowish brown flecks and points.

Both types were equally common but the first type he found only in nests of *Brachyspiza capensis.* The second he found in nests of *Thraupis sayaca.*

Sternberg (1869) and Holtz (1870) add similar notes on the variations occurring in the eggs of this Cowbird. The latter had 51 eggs in all of which 25 were pure white and 26 colored and was greatly puzzled by the presence of two such distinct types of eggs. He (p. 18) summarizes his ideas by saying that "1. either the *Molothrus* living in the vicinity of Buenos Aires (*M. bonariensis*) has the peculiarity of laying colored as well as white eggs," or "2. it is a different species which lays the white eggs." (trans. literally)

Hudson (1870, pp. 671-673) writes that he has never seen the Shiny Cowbird attack any bird to get into its nest, and believes that its eggs are invariably laid in the absence of the proprietors. "The Tijereta (*Milvulus violentus*)[2] that constantly attacks and beats off birds of prey, would not be easily driven off by a female Blackbird; and yet the Tijereta is the most imposed upon of any; while, on the other hand, the Blackbird's eggs are never found in the nests of some species that are not at all pugnacious such as that, for example of *Serpophaga nigricans.*

"A very remarkable circumstance is that the eggs of the Blackbird differ as much in form, size, and colour as its habits are irregular. Some are perfectly round, others oval, pointed, or elliptical. The commonest colours are pure white thickly covered with brownish red spots, the form of the spots on those darkly mottled being on different eggs round, oblong, and irregular."

In another publication (1920, pp. 74-82) Hudson summarizes his knowledge of the egg-laying habits of this bird as follows:

1. The Cowbirds frequently waste their eggs by dropping them on the ground.
2. They also occasionally lay in old forsaken nests. This he had often observed,

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[2] *Muscivora tyrannus.*

and to make very sure he took several old nests and placed them in trees and bushes, and found that eggs were laid in them.

3. They also frequently lay in nests where incubation has actually begun. When this happens the Cowbird's egg is lost if incubation is far advanced; but if the eggs have been sat on three or four days only, then it has a good chance of being hatched and the young bird reared.

4. One female often lays several eggs in the same nest.

5. Several females often lay in one nest, so that the number of eggs in it makes incubation impossible.

6. The Cowbirds, male and female, destroy many of the eggs in the nests they visit, by pecking holes in the shells, breaking, devouring, and stealing them.

7. The egg of the Cowbird is usually larger, and almost invariably hardershelled than are the eggs it is placed with; those of the Yellowbreast (*Pseudoleistes virescens*) being an exception.

8. The incubation period of the Cowbird is eleven and a half days.

9. He believed that each female Cowbird layed from sixty to one hundred eggs a season, judging from the large number of wasted eggs he found.

10. There is an extraordinary diversity in the color, form, and disposition of marking, etc., of the eggs of *M. bonariensis;* about half the eggs found are pure, unspotted white; others are sparsely sprinkled with minute specks of pink or gray. After the pure white, the most common variety is an egg with a white ground densely and uniformly spotted with red. Another not uncommon variety has a very pale, flesh-colored ground, uniformly marked with fine characters similar to pen scratches. A much rarer variety has a pure white shell with a few large or variously sized brown and chocolate spots. The rarest variety is an egg entirely of a fine deep red. " . . . . there are varieties without number; for there is no such thing as characteristic markings, in eggs of this species, although . . . . the eggs of the same individual show a family resemblance."

Gibson (1880, pp. 14-16) writes as follows of the eggs of the Shiny Cowbird: "My specimens (eggs) were mostly taken in one season; so that I can only state approximately the duration of the breeding season—namely, from 20th October to 10th January. It is likely, however, that it begins to breed earlier.

"Four was the largest number taken out of one nest (that of a Wren); and these were in various stages of incubation.

"Forty-seven specimens average 35/40 x 29/40 with some considerable variation. They are round in shape, and strong-shelled; the colour a glossy white or bluish white."

Holland (1892 p. 198) writes that in Entre Rios the laying season is from September to January and that the eggs vary from pure white to nearly pure red.

Aplin (1894 p. 172) found both white and spotted eggs in October and an early fledged young bird which had left a nest by the 27th of October.

The brothers Penard (F. P. and A. P., 1910 II p. 67) write that in Dutch Guiana, the local race of this Cowbird (*minimus*) seldom lays more than one egg in a nest.

Leo Miller (1917, p. 584) in the province of Salta, northwest Argentina, did not find a, " . . . . single egg of *M. b. bonariensis* on the ground," which is of interest in view of the fact that at Buenos Aires they frequently waste their eggs by dropping them on the ground, according to Hudson. Miller's observations were made chiefly towards the end of the breeding season.

The Egg-Laying Habits of the Shiny Cowbird

The eggs of the Shiny Cowbird are subject to greater variation in size, color, and markings than are those of any other member of its genus. In size they vary from 20x26 to 18x22 mm. The average is about 19x23 mm. In shape they may be almost spherical, rounded ovate, short ovate, oval ovate, or elliptical ovate.[3] The oval and the ovate types are the commonest. I have never seen any small eggs of this species that were either short ovate or rounded ovate in shape or any large eggs that were not of one of these forms. In texture the eggs of this Cowbird are similar to those of *Molothrus ater* of North America, being quite dull in appearance. In a small percentage of the eggs there is a noticeable gloss but even in these cases it is quite slight.

In color and markings the eggs of this species vary enormously and to describe all the different variations would be to describe most of the eggs in my collection. The ground color may be pure white, light cream, light bluish white, light greenish white, dark cream, or light brown, but it is constant for all the eggs of each individual bird. Some of the eggs are pure white without any spots or markings whatsoever. I have never heard of any unspotted eggs of this species that did not have a pure white ground color. This type of egg which puzzled Sternberg (see above) is of interest in that it is geographical. In eastern Argentina, Uruguay, and southeastern Brazil, from one-third to one-half of the Shiny Cowbirds lay eggs of this type while elsewhere in South America pure white eggs of this species are either entirely unknown or are at most very rare. Señor Venturi found two plain white eggs of this bird in Tucumán, northwestern Argentina, in 1923; but only these two, out of hundreds of *M. bonariensis* eggs found by him in that province, were unspotted. I have seen pure white eggs only from the provinces of Buenos Aires and Entre Rios, but they doubtless do occur in Corrientes, Santa Fe, Chaco, and Missiones. It might be thought that the Cowbirds laying pure white eggs would utilize a larger proportion of domed nests than the individuals laying speckled eggs. This is not the case. A study of the nests in which eggs of this type have been found shows that the percentage of domed to open nests is the same as if all nests containing all types of Cowbirds' eggs were tabulated. Furthermore most of the pure white eggs are found in open nests, especially those of *Brachyspiza*, *Mimus*, and *Pseudoleistes*. It seems impossible to attach any particular significance to these white eggs but it may be that with the loss of the parental instincts, and the accompanying ideas of protection which manifest themselves structurally in color, etc., as well as directly in habit, there may be a corresponding lack of stimulus to the pigment glands of the oviduct. If this be so, then it would seem as though similarity between the eggs of the Cowbird and those of its victims had no selective value and that the species was gradually losing the unnecessary pigmentation of its eggs. It is still local geographically but it is probably spreading westward as indicated by Venturi's recent record of two specimens from Tucumán. However, until much more is known of the physiology of egg pigmentation, this matter may best be left unexplained as any present hypothesis would be based more on lack of knowledge than on the possession of facts.

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[3] Terms of egg-contours taken from Plate XVI of Ridgway's "Nomenclature of Colors for Naturalists, and Compendium of Useful Knowledge for Ornithologists"; 1886 Boston; Little, Brown, and Co.

The spotted eggs are of many types. Some are heavily blotched, spotted, and speckled, while others are minutely, though plentifully, dotted. In some cases all the markings on any one egg are the same in color but in most cases markings of two shades of brown occur together, one redder and the other grayer. These markings vary in color from tawny brown, dark rufus, rusty brown to earth brown, umber, and purplish gray. The abundance of markings also varies. Some eggs are so heavily spotted as to look very dark while others are merely flecked lightly with dark brown. The heaviest markings are usually toward the large end of the egg but may occur elsewhere as well but in smaller numbers. In extreme cases the blotches at the large end almost fuse into one large patch of brown covering a third of the surface of the egg.

The number of eggs a Cowbird lays in one season has never been determined. The many difficulties in the way of making such a determination are sufficient reason for the lack of positive information on this point. Hudson estimated that each female probably laid from sixty to one hundred eggs a season, basing his estimate on the number of wasted eggs found. With his estimate I disagree entirely and for his sixty to a hundred would substitute six to ten. I never found more than four discharged follicles in the ovary of any specimen of this Cowbird.

In a previous section, in dealing with the territorial relations of this species I gave a brief account of the eggs laid in one territory by the female of that territory and by wandering birds that deposited one or two eggs apiece in that area. The identity of the eggs was based on size, color, shape, and date of deposition. The last item was never needed for identification but was mentally "held in reserve" for emergencies. That is to say, if two very similar eggs were laid on the same day, the date of deposition would signify that both were not laid by the same bird. The female belonging to that particular territory laid all its eggs at daily intervals in nests of the Chingolo Song Sparrow (*Brachyspiza capensis*). The first egg was laid on October 25, 1923, before 8 A.M. The second egg was laid between 8 P.M. of that day and 8 A.M. of the next day. On the third and fourth days, I was able, by late nocturnal visits, and early morning inspections, to prove that the eggs were laid early in the morning somewhere between 4:30 A.M. and 7 A.M. Unfortunately after finding one egg daily for four days, I found no more, but as there were great numbers of Chingolos nesting in that area, the Cowbird probably laid in nests that I had not previously located. However, other Cowbirds laid eggs in nests in this territory at the same time. Thus in nest 1 (see map, p. 75) four different Cowbirds deposited one egg each; in nest 2, eggs were laid by two Cowbirds; in nest 3, two Cowbirds laid an egg each; and in the last nest, 4, one Cowbird deposited an egg. All in all no less than six different female Cowbirds had laid in these four nests, but only one of them, the bird that obviously belonged in that territory, laid in all four. These four eggs were laid at intervals of one day, while one of the "visiting" females that was responsible for two of the other eggs laid those two four days apart, probably laying in other nests in other territories in the interval. In the first nest, in which four individuals deposited eggs, two of them laid in it on the same day, and the other two on separate, but successive days.

All this not only shows that the interval between eggs is one day, but also that several females often lay in one nest. It is also true that sometimes one female lays more than one egg in the same nest.[4]

It will be noted that in the territory under discussion the female belonging to that territory laid all its eggs (at least all the eggs found) in nests of a single species. Is this to be interpreted as specificity in the sense that the European Cuckoo is called specific? I think not, for the only birds nesting on that territory at the time were Chingolos. Moreover, in other territories where the variety of available nests was greater there never seemed to be any indication of specificity in the parasitic habits of the Cowbirds.

The Shiny Cowbird is very wasteful of its eggs, frequently laying in nests already crowded with Cowbird eggs, or in deserted nests, and even on the ground. This last gave rise to the belief that this bird lays its eggs on the ground and then carries them in its beak and places them in various nests in this way. This was doubtlessly inspired by the widespread but erroneous tale of the European Cuckoo which has only recently been corrected by the work of E. P. Chance. There is absolutely no reason to believe that eggs laid on the ground by the Cowbirds are ever carried in the bill to nearby nests. As a matter of fact the only way in which it ever became known that the Cowbird did sometimes lay on the ground was that the eggs were left there and subsequently found by observers. If the birds were in the habit of carrying them in their bills no one would have ever known it for there would have been no tell-tale evidence. The fact that considerable numbers of eggs are laid on the ground and left there indicates that the supply of eggs exceeds the supply of nests in which to lay them. This is substantiated by the fact that eggs are found wasted in this way chiefly in places where the Cowbirds are very numerous, mainly around farm lands. In the wilder districts where the *Molothrus* is less abundant very few eggs are wasted in this manner as the supply of nests is sufficient to accomodate all the eggs laid. It is likewise true that most of the nests in which there are very large numbers of Cowbirds' eggs are found in settled regions where the numerical status of the parasite is far above its normal figure.

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[4] For extreme instances of this I refer the reader to the account of the Rufus Ovenbird, *Furnarius rufus,* in the annotated list of the victims of the Shiny Cowbird (p. 96).

Extremely large numbers of eggs of this Cowbird are sometimes found in single nests, particularly nests of Ovenbirds (*Furnarius*) and to a lesser extent, those of Mockingbirds (*Mimus*) and Yellow-breasted Marsh Birds (*Pseudoleistes*). The record number is 37 Cowbirds' eggs in one nest of a Rufus Ovenbird, reported by Leo Miller (1917). The same author also records nests of the Ovenbird with 15, 17, 20, 25, and 26 Cowbird eggs. In all cases where such large numbers of the parasitic eggs are laid in single nests, the nests are deserted, often before many of the eggs are laid, and, sometimes even before the Cowbirds begin laying in them. All these nests containing unusual numbers of eggs, of which we have definite data, were collected late in the breeding season: in January, to be exact. No comparable records have been found early in the season, at least not until after the height of the season was past. Also, Miller writes that flocks of Cowbirds were seen in the same trees as some of the nests mentioned.

If we recall some of the facts of the migratory habits and territorial relations of the Cowbirds, we find that the adult birds arrive first and the year-old individuals later. From this it seems probable that the adult birds would be the first to establish territories and the first ones to breed. This means that they would be through breeding before the year-old birds. In other words, the eggs found towards the end of the season would probably be those of the yearling birds. Furthermore, by the time these latter individuals would be ready to start breeding, the older birds would be already established in their "territories" and most of the land already occupied. This would mean that the younger birds would be forced either to congregate into such places as were still available or else to encroach on the territories of the older birds. In either case the number of breeding birds per given area would be unduly increased. Also the number of nests still available would be less than early in the season. The two factors working together would tend towards every large nest being filled with eggs of these late-breeding Cowbirds. Early in the season, when the *Molothrus* can use nests of such birds as sparrows, mockingbirds, etc., it rather seldom makes use of the ovens of *Furnarius.* It follows then that these large clutches of parasitic eggs are probably the product of the the year-old birds without real territories.[5]

As many as thirteen different Cowbirds have been found to lay into the same nest in one of these extreme cases late in the season. Also single birds have been known to lay as many as four eggs in the same nest. However, if we omit these late nests, the eggs in which probably are those of yearling birds, and consider the normal state of affairs throughout the breeding season of the species, we find that usually a Cowbird lays but one egg in a nest, but the percentage of nests in which are found more than one egg of the same Cowbird is higher for this species than it is for the North American *M. ater.* In the latter species for every nest containing more than one egg of the same Cowbird, we find three nests containing but a single egg apiece. In the case of *M. bonariensis* the ratio is about three nests with single eggs to two with multiple ones. However, in the case of the Shiny Cowbird it is far commoner to find two or more females laying in the same nest than it is in the case of the North American species. In the former, about two-thirds of the victimized nests contain eggs of two or more Cowbirds, while in the latter, in only slightly more than one-third of the parasitized nests do we find eggs of more than one Cowbird. This difference is due to the difference in abundance of the two species, the Argentine species being certainly twice as numerous in its range as the North American one is in its country.

The Shiny Cowbird destroys a great many eggs of its own species as well as of its victims by puncturing the eggs in a nest before laying into it. This habit is possessed by individuals in different degrees as I seldom found it practiced by the birds in parts of Tucumán, while in other sections it seemed to be a common habit. Hudson records that both the male and female destroy eggs in the nests they visit by pecking holes in them and devouring the contents. He writes that he has seen a female Cowbird strike her beak into an egg and fly away with it; and has often watched the male perched by while the female was on the nest, and when she quitted it has seen him drop down and begin pecking holes in the eggs. "In some nests found full of parasitical eggs every egg has holes pecked in the shell, for the bird destroys indiscriminately eggs of its own and of other species." In this way, in regions where the Cowbirds are exceedingly common and checks upon their increase at the expense of the rest of the bird population are lacking, the species acts as a check upon itself. If it did not, the rapid increase of the Cowbirds in any locality would soon cause a scarcity of hosts, which would in turn cause a diminution in the number of young Cowbirds raised, which in turn would give the fosterers a chance to increase again, and so on in an endless series of waves of depression and inflation of the population both of the parasite and its victims. This egg-pecking habit tends to maintain a normal, instead of a shifting, status of bird population.

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[5] For further discussion of this point see under Rufus Ovenbird (p. 96).

Of the original significance of this habit we may speculate but not make any definite declaration, and I offer the following interpretation only as a suggestion. The more primitive, non-parasitic Cowbird stock from which this species is descended, and of which the Bay-wing is the only remnant, probably was similar in its breeding habits to the Bay-winged Cowbird as we know it. That is to say, it did not build its own nest if it could possibly get one already built by another species, and often fought with the builders for the possession of the nests. Very probably in many cases when they finally got possession of the nests they found eggs of the builders still in them. In throwing out these eggs the egg-pecking habit probably originated for the bill would be the organ used in ejecting the eggs. This would in time lead to a habit of pecking or totally destroying all the eggs in a nest before using it, which would account for the lack of discrimination between eggs of its own and other species shown by the Shiny Cowbird. The habit of pecking all the eggs in the nest would probably be more of a hindrance than a help to a parasitic species, taking all things into consideration, for it would often cause the nest-owners to desert and thereby doom the parasitic eggs as well as the others. Therefore it is not surprising to find that the habit is no longer universal, but more or less sporadic in character in this species and quite rare in its higher relative, the North American Cowbird. So then it seems as though this habit of the Shiny Cowbird is a relic of the past history of the race but it is still of some value where the species is unusually numerous, although its present usefulness is very different from its original purpose.

This would also account for the fact that the males, as well as the females sometimes peck eggs, for in the case of the Bay-wing, both sexes fight for the nest and work on it afterward. Getting rid of any eggs previously laid by the builders would be part of the work the Bay-wings would do immediately after taking possession of the nest.

The Shiny Cowbird sometimes removes an egg from a nest before laying one of its own, but does not always do this. It is very irregular in this respect, much like its North American congener.

In Tucumán, Argentina, the breeding season of this Cowbird begins about the third week of October and continues until about the first week in January. Further north, in Salta, Miller has recorded eggs well advanced in incubation on February 10, which means that they were laid about the beginning of the month. Holland, in Entre Rios, found eggs as early as late September. The height of the season in the northern half of Argentina and in Uruguay is November and December. In the tropical parts of South America seasons are not definite and it may be that the species breeds at almost any time of the year.

The incubation period varies from eleven to twelve days. Hudson recorded it as eleven days and a half, but in some nests that I watched it took fairly twelve days. The size of the incubating birds seems to make little difference in the incubation period. The weather being warm, there is little danger of the eggs getting chilled. In this connection the following note, taken from Hudson (1920, p. 78) is of interest. The Yellow-browed Tyrant, *Sisopygis icterophrys* frequently buries the eggs of the Cowbirds by building a new floor to the nest. Hudson found one of these nests containing two half-fledged young birds besides three addled eggs, and opened it, removing ". . . . the upper portion of the nest intact, and discovered beneath it three buried *Molothrus* eggs, their shells encrusted with dirt and glued together with broken egg matter spilt over them . . . . two were quite rotten but the third contained a living embryo, ready to be hatched, and very lively and hungry when . . . . in my hand. The young Tyrant-birds were about a fortnight old, and as they hatch out only about twenty days after the parent-bird begins laying, this parasitical egg with a living chick in it must have been deeply buried in the nest for not less than five weeks."

The Victims

The Shiny Cowbird victimizes most of the smaller passerine birds of its region and when the bird life of South America is as well known as that of its northern neighbor, the list of species victimized by *M. bonari-*

ensis and its races will probably total many hundreds. At present most of our data on the breeding habits of neotropical birds come from Argentina and Uruguay, and to a much lesser extent, southeastern Brazil and parts of Peru and the Guianas. From large parts of the known range of the Cowbird we have absolutely no data. In the course of my field work in Argentina I found Cowbirds' eggs in nests of 22 species. Several other observers have recorded nests containing eggs or young of the parasite and all such available records have been brought together in the following annotated list.

As in the case of *M. ater*, the present species probably lays in unsuitable nests not infrequently, but so far at least, its eggs have not been found in nests of any non-passerine birds. Our knowledge of the Argentine avifauna is still too imperfect to warrant any generalizations such as are possible in North America, but probably much of the general data given for the victims of *M. ater* (see pp. 189-191) will be found to hold for those of *M. bonariensis* as more is learned of them.

There are, however, some differences between these two Cowbirds in this respect. *M. ater* rarely, almost never, victimizes Mockingbirds while *M. bonariensis* very commonly inflicts its eggs upon the various species of Mockingbirds found in Argentina. In habits, nests, and eggs, the North American species *Mimus polyglottos* is very similar to its Argentine congeners, *Mimus saturninus modulator, Mimus triurus, Mimus patagonicus,* etc. Why should Mockingbirds be parasitized in one country by one Cowbird and almost never in another country by a closely related Cowbird? Another case in point is the genus *Muscivora.* The Fork-tailed Flycatcher, *Muscivora tyrannus*, of South America, and the Scissor-tailed Flycatcher, *Muscivora forficatus*, of Mexico and southern United States, are very similar in nests, eggs, and habits. Both are pugnacious to the same degree yet the former is a common victim of the Shiny Cowbird while the latter has almost never been found to be imposed upon by the North American parasite. Another difference is that *M. bonariensis* seems to utilize marsh nests somewhat more than its northern relative while the latter is slightly more inclined to deposit its eggs in woodland nests than is the case with former.

Of the reactions of the victims to the eggs of the Shiny Cowbird but little is known. Most of them seem not to mind them but the Yellow-browed Tyrant, *Sisopygis icterophrys,* sometimes buries the parasitical egg by building a new floor to the nest, and the Vermillion Flycatcher, *Pyrocephalus rubinus,* is said to desert its nest if a Cowbird lays in it. Of course when large numbers of parasitic eggs are laid in any one nest the owners desert it.

As far as I have been able to learn from personal field work, from correspondence with other field men in Argentina, and from a survey of the literature, *Molothrus bonariensis* (with all its races) has been found to parasitize 98 species and subspecies of birds. Undoubtedly many more species will have to be added as time goes on.

Before passing to a detailed consideration of the victims it may be well to first list them for each race of the Shiny Cowbird as is done below.

Molothrus bonariensis bonariensis

Rhinocrypta lanceolata	Gallito
Thamnophilus ruficapillus ruficapillus	Red-capped Antbird
Taraba major major	Large Ant Thrush
Furnarius rufus rufus	Rufus Ovenbird
Furnarius rufus badius	White-throated Ovenbird
Furnarius cristatus	Crested Ovenbird
Siptornis hudsoni	Hudson's Spine-tail
Synallaxis albescens	White-throated Spine-tail
Leptasthenura ægithaloides	Tit-like Spine-tail
Xenopsaris albinucha	White-naped Cotinga
Fluvicola albiventer	Swallow-like Tyrant
Tænioptera nengeta	Pepoaza Tyrant
Tænioptera irupero	Viudita
Lichenops perspicillata	Silverbill
Sisopygis icterophrys	Yellow-browed Tyrant
Knipolegus cabanisi	Cabanis' Black Tyrant
Machetornis rixosa rixosa	Short-winged Tyrant
Serpophaga nigricans	Little River-side Gray Tyrant
Myiosympotes flaviventris	Reed Tyrant
Elænia albiceps	D'Orbigny's Crested Flycatcher
Suiriri suiriri	Suiriri Flycatcher
Pitangus sulphuratus bolivianus	Bienteveo
Myiodynastes solitarius	Solitary Flycatcher
Myiophobius fasciatus fasciatus	Little Brown Flycatcher
Pyrocephalus rubinus rubinus	Vermillion Flycatcher
Empidonomus a. aurantio-atrocristatus	Black and Gold Crested Flycatcher

Tyrannus melancholicus melancholicus	Bellicose Tyrant
Muscivora tyrannus	Fork-tailed Flycatcher
Phæoprogne tapera	Tree Martin
Tachycineta leucorrhoa	White-rumped Tree Swallow
Troglodytes musculus guarixa	House Wren
Troglodytes musculus hornensis	Pale House Wren
Turdus rufiventris	Red-bellied Thrush
Turdus leucomelas	Dusky Thrush
Turdus nigriceps	Dusky-headed Thrush
Turdus amaurochalinus	Grayish Thrush
Minus triurus	White-banded Mockingbird
Mimus saturninus modulator	Calandria
Mimus patagonicus	Patagonian Mockingbird
Mimus thenca	Chilean Mockingbird
Polioptila dumicola	Gnatcatcher
Vireosylva chivi chivi	Chivi Vireo
Cyclarhis gujanensis viridis	Azara's Greenlet-Shrike
Anthus lutescens lutescens	Rufous Pipit
Anthus correndera	Cachila Pipit
Geothlypis æquinoctialis cucullata	Hooded Yellow-throat
Thraupis sayaca sayaca	Blue Tanager
Thraupis bonariensis	Blue and Yellow Tanager
Thlypopsis sordida sordida	Orange-headed Tanager
Pheucticus aureiventris	Orange-vented Grosbeak
Cyanocompsa cyanea argentina	Argentine Blue Grosbeak
Saltator cœrulescens cœrulescens	Gray Saltator
Saltator aurantiirostris	Orange-billed Saltator
Sporophila cœrulescens	Vieillot's Seed-eater
Spinus barbatus	Black-chinned Siskin
Spinus ictericus ictericus	Black-headed Siskin
Sicalis pelzelni	Yellow House Sparrow
Sicalis arvensis arvensis	Misto Yellow Finch
Sicalis luteiventris	Meyen's Yellow Finch
Pseudochloris aureiventris	Yellow-bellied Ground Finch
Atlapetes citrinellus	Yellow-striped Finch
Coryphospingus cucullatus	Red-crested Finch
Brachyspiza capensis capensis	Chingolo Song Sparrow
Brachyspiza capensis chilensis	Chilean Song Sparrow
Brachyspiza capensis hypoleuca	Salta Song Sparrow

Brachyspiza capensis argentina	Argentine Song Sparrow
Brachyspiza capensis pulcayensis	Bolivian Song Sparrow
Poospiza melanoleuca melanoleuca	White-breasted Warbling Finch
Poospiza whitii	White's Warbling Finch
Poospiza nigrorufa	White-cheeked Warbling Finch
Myiospiza humeralis tucumanensis	Tucuman Finch
Myiospiza humeralis dorsalis	Cordoba Finch
Saltatricula multicolor	Many-colored Finch
Embernagra platensis	La Plata Ground Sparrow
Diuca diuca	Diuca Finch
Diuca minor	Lesser Diuca Finch
Paroaria cucullata	Brazilian Cardinal
Agelaioides badius	Bay-winged Cowbird
Agelaius thilius	Yellow-shouldered Blackbird
Agelaius flavus	Yellow-headed Marsh Blackbird
Agelaius ruficapillus	Red-headed Marsh Bird
Pseudoleistes virescens	Yellow-breasted Marsh Bird
Trupialis militaris militaris	Patagonian Marsh-Starling
Trupialis defilippii	De Filippi's Marsh-Starling

Molothrus bonariensis minimus

Fluvicola pica	White-shouldered Water Tyrant
Troglodytes clarus	Trinidad Wren
Xanthomus icterocephalus	Yellow-headed Marsh Bird
Lampropsar guianensis	Guiana Grackle
Icterus xanthornus	Yellow Oriole

Molothrus bonariensis venezuelensis

Cranioleuca vulpina alopecias	Northern Rusty-backed Spine-tail
Thraupis episcopus nesophilus	Bishop Tanager
Gymnomystax mexicanus	Giant Oriole

Molothrus bonariensis occidentalis

Troglodytes audax	Tschudi's House Wren
Heleodytes balteatus	Baird's Marsh Wren
Anthus rufus peruvianus	Peruvian Pipit
Piezorhina cinereus	Cinereous Finch
Brachyspiza capensis peruviana	Peruvian Song Sparrow
Dives warszewiczi	Warszewicz's Grackle

ANNOTATED LIST

Rhinocrypta lanceolata (Is Geoffroy and d'Orbigny). Gallito.

Wetmore, (Bull. 133 U.S.N.M., 1926, pp. 290-291), found a nest of the Gallito or "Little Cock" in the valley of the Rio Negro, below General Roca, Rio Negro, on December 3, 1920, containing two Cowbirds' eggs as well as two others, one of which was certainly a *Rhinocrypta's* while the other may have been deposited by some *Synallaxis*. The nest was " . . . . placed more than a meter from the ground amid heavy branches in a dense, thorny bush. The somewhat bulky structure was an untidy affair made of weed stems, bits of bark, and grasses, lined with finer material. The top was covered in an arch, and the entrance was a large irregular opening in one side."

Thamnophilus ruficapillus ruficapilus (Vieill.) Red-capped Antbird.

This species is listed by Devincenzi as a victim of the Shiny Cowbird in Uruguay. He records it on first-hand evidence, not on the basis of someone else's report. I have no data on this antbird as a molothrine victim in Argentina.

Taraba major major (Vieill.). Large Ant-thrush.

Señor Girard has recorded this Ant Thrush as a victim of the Shiny Cowbird at Rio Colorado, Tucumán, and Rosario Frontera, Prov. of Salta. Five definite nest records as follows:

1. Rosario Frontera, Salta; November 25, 1907; 1 egg of *Taraba major* and 1 of *Molothrus bonariensis*.
2. Manchala, Rio Colorado, Tucumán; December 22, 1921; 1 egg of *T. major* and 3 of *M. bonariensis*.
3. Manchala, Rio Colorado, Tucumán; November 25, 1924; 3 eggs of *T. major* and 2 of *M. bonariensis*.
4. Manchala, Rio Colorado, Tucumán; January 12, 1923; 2 eggs of each.
5. Tafi Viejo, Tucumán; November 30, 1909.

Furnarious rufus (Gmelin). Rufous Ovenbird, Casero, Hornero.

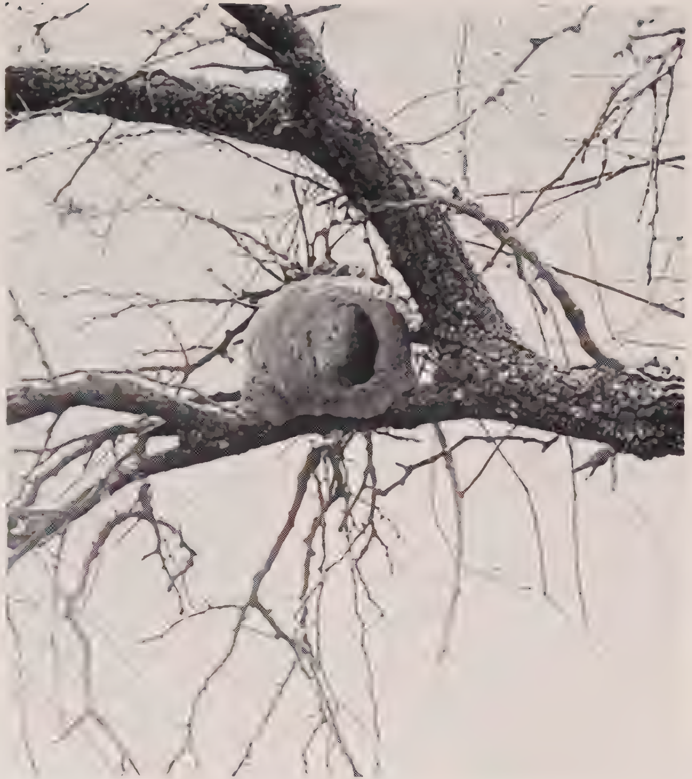
This remarkable bird, one of the avian personalities of the Argentine, is a common victim of the Cowbird. Incredibly large numbers of the parasitic eggs have been found in single nests of this bird—as many as 37 in the record case. Of course, nests in which large numbers of Cowbird eggs have been deposited are deserted, in fact it is quite safe to say that most of the eggs in such cases are laid after the Ovenbirds have abandoned the nests.

The wonderful nests made by the "Horneros" are much sought after by many kinds of birds among which are the common Martin, *Phæoprogne tapera,* the White-rumped Swallow *Tachycineta meyeni,* the Wren, *Troglodytes furvus,* the Short-winged Tyrant, *Machetornis rixosa,* and the Yellow Seed Finch, *Sycalis pelzelni.*

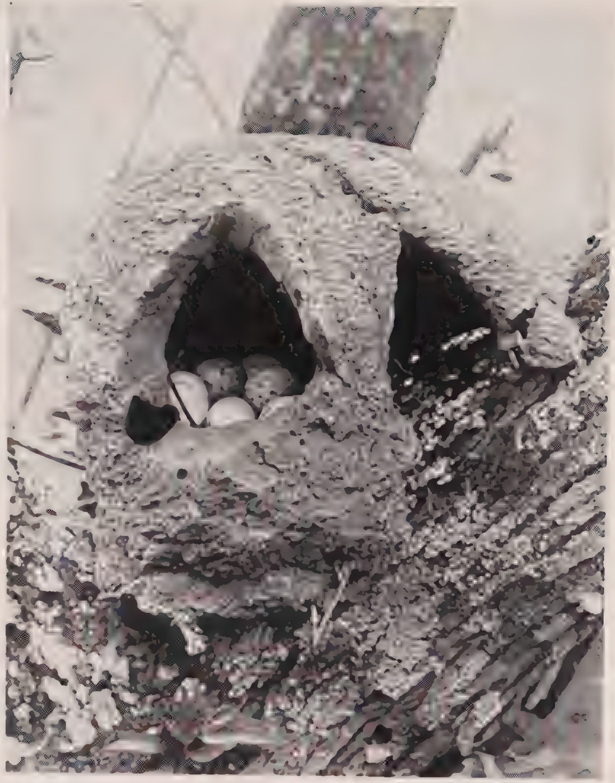
Thus it follows that in some cases these birds may be found to have Cowbird eggs mixed with theirs because the *Molothrus* may have laid in the nest before the change of occupants took place.

Although the ovens of the "Hornero" are frequently used by the Shiny Cowbird as a receptacle for its eggs, the percentage actually parasitized is smaller than published accounts indicate. This is partly due to the large size and pugnacity of the *Furnarius.* During the course of field work in Argentina I examined 217 nests of the

PLATE V.



Nest of Furnarius rufus.



Nest of Furnarius rufus Opened to Show Eggs.
(Three eggs of *Furnarius rufus* and three of *Molothrus bonariensis*)

Rufous Ovenbird of which 61 were occupied at the time by their builders. Of the 61 only 18 contained eggs or young of the Cowbird. Of the 156 nests not used at the time by the Ovenbirds only 49 were in use at all and, of these, 2 contained eggs of *Molothrus bonariensis.* In one nest taken at Concepción, Tucumán, on November 27, 1923, there was 1 egg of the Shiny Cowbird and together with it were 7 small tree toads, *Hyla nasica.*

Miller (1917 p. 584) writes that the bird, " . . . . which suffers most from the parasitic habits of the Cowbird in the vicinity of Rosario de Lerma (province of Salta) is the Ovenbird (*Furnarius rufus*); however, of the great number of eggs laid in the nests of the above named species, our observations tend to show that the greater part are lost. Among the scores of Ovenbird nests which we examined, only two were still occupied by the owners, the desertion being apparently due to the invasion of the Cowbirds. So persecuted were the Ovenbirds that it is difficult to understand how any of them survived in this immediate locality. The nests were common enough, it being not unusual to find several of them in a single tree, but the birds themselves were not abundant. It is possible that some of the pairs may have built several nests each in their vain attempts to escape the attentions of the Cowbirds.

"In no instance had the walls or top of the Ovenbirds' nests been broken or perforated in any manner, in order that light could penetrate to the interior; they were not tampered with in any way, and the Cowbirds seemed content to use them just as the Ovenbirds had constructed them."

The largest number of Cowbird's eggs I have ever found in a single nest of the Ovenbird is 4 but Miller (1917) found some nests containing numbers of the parasitic eggs so remarkable as to warrant mention here.

Contents of nests recorded by Miller (1917, pp. 588-590) all taken at Rosario le Serma, Salta province, in 1916.

1. Jan. 10—2 young ovenbirds and 2 eggs of the cowbird.
2. Jan. 11—deserted nest—4 addled cowbird eggs and shells of a number of others which had become broken.
3. Jan. 12—no eggs of ovenbird, 15 eggs of *M. bonariensis,* one of which was fresh, the others spoiled.
4. Jan. 12.—no eggs of ovenbird, 26 of *M. bonariensis,* 11 of which were fresh.
5. Jan. 13—1 egg of ovenbird and 6 of cowbird, all fresh, but nest deserted.
6. Jan. 13—1 ovenbird and 4 cowbird eggs, all fresh.
7. Jan. 14—no ovenbird and 9 cowbird eggs.
8. Jan. 14—no ovenbird and 25 cowbird eggs, laid by no less than 13 different individuals.
9. Jan. 15—no ovenbird and 20 cowbird eggs of which only 12 were seen by Miller, the nest having been collected by a native assistant. The 12 eggs were laid by 5 different birds.
10. Jan. 15—no ovenbird and 2 cowbird eggs.
11. Jan. 16—1 ovenbird and 37 cowbird eggs, of which only 5 were fresh.
12. Jan. 16—1 ovenbird and 17 cowbird eggs, all fresh, laid by 12 different birds.

Needless to say, in every case where large numbers of eggs were found in a nest, that nest had been deserted and the eggs consequently doomed. However, the important point is the fact that large numbers of eggs are wasted by the Cowbirds.

Why should birds lay so many eggs together instead of scattering them among many small nests where they might have a chance of being cared for? Never having had any personal experience with egg wastage on such a scale in this species, I can only suggest an explanation which seems logical to me and is not opposed to any of the known facts.

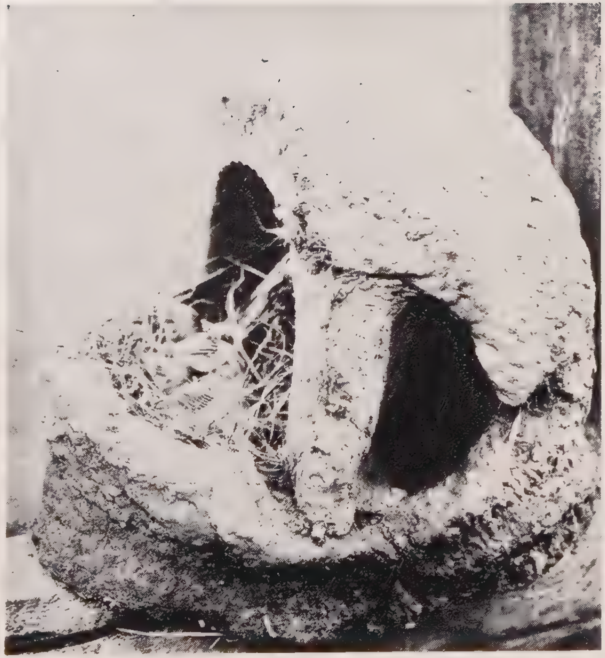
In the first place it should be noted that all these nests were collected late in the breeding season (season is September to January). Secondly I know of no records of such large numbers of eggs in single nests early in the season, at least not until after the season has passed its climax and was on the decline (not before well into December). I say this after a diligent search through literature, correspondence with various observers, and my own field experience with the species. Thirdly, in Miller's paper it is stated in connection with many of these nests that flocks of the Cowbirds were seen in the same tree.

Now we have seen in preceding sections of this work that in migration and in the establishment of breeding areas the adult Cowbirds come first and the year-old birds follow a good deal later. So then it seems likely that most of the adults would be through breeding before the year-old birds and from this follows that the latest eggs of the season would probably be those of the younger birds. Then, too, by the time the year-old birds were ready to begin laying, all the district would have been already staked out into territories by the adults. From this it follows that there would be a tendency for the yearling birds to congregate in whatever places were left. Also most small birds would be through breeding and their nests either destroyed by the elements or hard to find as the Cowbirds find such nests by watching the birds coming and going to and from their nests. So then if the year-old Cowbirds found large nests it would not be surprising if many of them would lay in each one and not only once at that. It should be remembered that of 217 Ovenbirds' nests found early in the season, (September through December), only 20 contained Cowbirds' eggs, so that these are not favored by the *Molothrus* when they can avail themselves of nests of smaller birds, as *Brachyspiza, Muscivora,* etc. I think that the large clutches of 25 and 37 eggs are the product of year-old birds without territories and that the instinct to breed is strong enough to manifest itself even though its strength is its own undoing, for the reproductive zeal of the many renders vain the efforts of the individuals.

Just what percentage of the Cowbird eggs laid in nests of the Ovenbirds early in the season ever hatch is hard to say but it must be fairly high. Of course not many are laid in any one nest. The larger size of the Ovenbirds' eggs does not seem to keep the *Molothrus* eggs from hatching first and I have never seen any case of the young of the two species growing up together. I have found nests containing young Cowbirds and eggs of the Ovenbird and others with young Ovenbirds and eggs of the Cowbird but never young of both. I have, however, heard of one such case.

At Santa Elena, Entre Rios, I was told by a reliable observer (Mr. A. Philip) of a case where an Ovenbird was watched for some days and while it had two young of its own already out of the nest, it was noted that it returned to the nest with food for several days after its own young had left the nest. Finally, a young Cowbird emerged and after that the Ovenbird did not return to the nest anymore.

Two races of the Rufous Ovenbird are victimized by the Cowbird—*Furnarius rufus rufus* (Gmel.) and *Furnarius rufus badius.* (Licht.).



Nest of Furnarius rufus Opened to Show Two Young Molothrus bonariensis.

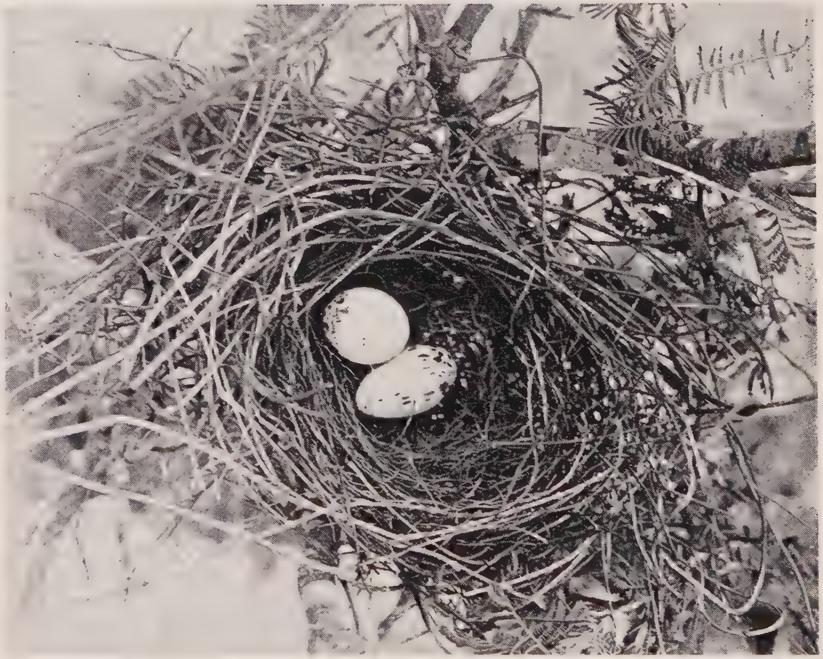


PLATE VI.

Nest of Tyrannus melancholicus with One Egg of the Tyrant and One of the Molothrus bonariensis.

Furnarius cristatus (Burm.). Crested Ovenbird.

Out of seven nests of this bird found at Rio de Gastone, Tucumán, one contained 2 eggs of the Ovenbird and 2 of the Cowbird. This nest was found in Nov. 24, 1923, and as far as I know is the only record of this species suffering from the parasitic habit of the *Molothrus bonariensis.* I cannot see why this bird should be well nigh exempt from the Cowbird while its larger relative *Furnarius rufus* is fairly commonly victimized.

Siptornis hudsoni (Scl.). Hudson's Spine-tail.

Grant (Ibis 1911 p. 131) found two nests of this species both of which contained eggs of *Molothrus bonariensis.* The nests of this bird are very well hidden and are probably rather infrequently visited by Cowbirds.

Cranioleuca vulpina alopecias (Pelz.). Northern Rusty-backed Spine-tail.

Cherrie (1916, p. 261) found a nest of this species at Caicara, Venezuela, on July 2, 1907, containing two fresh eggs of the Cowbird in addition to the eggs of the owner. The Cowbird in question is the Venezuelan subspecies, *Molothrus bonariensis venezuelensis.* I know of no other record. In the same paper (p. 211) this record is erroneously referred to *Synallaxis cinnamomea striatipectus.*

Synallaxis albescens (Temm.). White-throated Spine-tail.

One record. (J. M. Goodall, Bull. Brit. Orn. Cl., xliii, 1923, p. 68), probably in Cordoba, Argentina.

Leptasthenura ægithaloides (Kittl.). Tit-like Spine-tail.

Gibson lists this species as a molothrine victim in the Cape San Antonio region, Buenos Aires. (Ibis 1880 p. 15)

Xenopsaris albinucha (Burm.). White-naped Cotinga.

One record; a nest found by Pablo Girard at Manchala, near Rio Colorado, Tucumán, November 23, 1925, containing one egg of the owner and one of *Molothrus b. bonariensis.*

Fluvicola pica (Bodd.). White-shouldered Water-Tyrant.

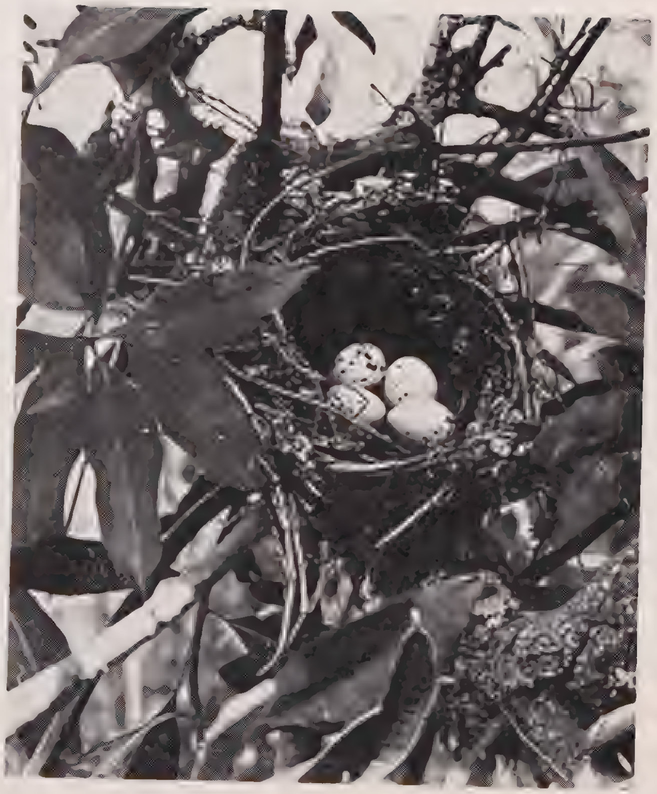
Chubb (1921 II p. 564) writes that in British Guiana this species is victimized by the local race of the Cowbird—*Molothrus bonariensis minimus.*

Fluvicola albiventer (Spix.). Swallow-like Tyrant.

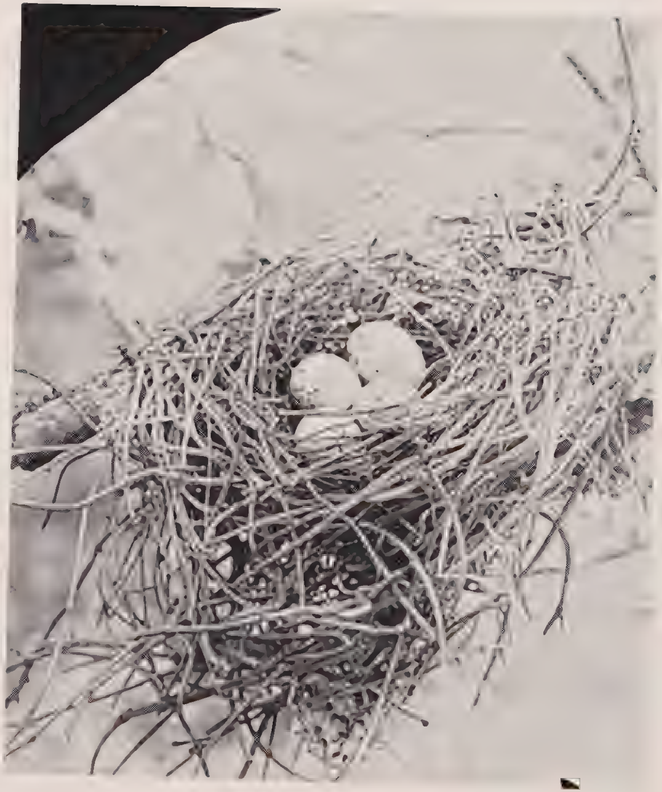
Three records. Miller (1917 p. 590) found one of the dainty purse-shaped nests of the Swallow-like Tyrant at Embarcacion, Chaco, on January 28, 1916. It was placed in a bush about two feet above the water of a lagoon and contained one egg of the flycatcher and one of *M. bonariensis,* both addled. I found over 20 of these nests in various parts of the Argentine, chiefly in Tucumán and Santa Fé, but never with any parasitic eggs in them, and I judge that this species is not frequently molested. The nest is reminiscent of that of a Long-billed Marsh Wren (*Telmatodytes palustris*) of North America but much finer in construction and is not an easy nest for a Cowbird to lay in.

Pablo Girard found a nest at Manchala, Rio Colorado, Tucumán; February 22, 1925; 1 egg of the owner and 1 of the Cowbird. He found another nest with 2 eggs of the Tyrant and 1 of the parasite at the same place on January 12, 1926.

PLATE VII.



Nest of Muscivora tyrannus with Three Eggs of the Owner and One of Molothrus bonariensis.



Nest of Empidonomus aurantioatrocristatus with Three Eggs of the Owner and One of Molothrus bonariensis.

Tœnioptera nengeta (Linn.). Peopoaza Tyrant.

Aplin (1894, p. 175-6) records two nests of this flycatcher on November 8, one with 1 egg of the owner and 3 of the Shiny Cowbird, and the other with 1 egg of each, that of the Cowbird being broken. He wonders that, " . . . . the Cowbirds ever 'got at' these nests, especially that of the first pair, one of which was generally mounting guard." I know of no other instance of this bird being molested by the Cowbird.

Tœnioptera irupero (Vieill.). Viudita.

A single record has come to my notice; a nest found by Pablo Girard at Manchala, near Rio Colorado, Tucumán, on November 2, 1925, containing one egg of the owner and two of *Molothrus b. bonariensis.*

Lichenops perspicillata (Gm.). "Pico de plata" Silverbill.

This curious little flycatcher has been recorded by Gibson as a molothrine victim. No other records have come to my notice. The Silverbill nests in the bases of tussocks of giant grasses and reeds in much the same way as the Maryland Yellowthroat (*Geothlypis trichas*) of North America and in fact the nests of the two are very similar and equally well hidden. On the whole, however, the *Lichenops* is less apt to be victimized by *Molothrus bonariensis* than is *Geothlypis* by *M. ater* as the Silverbill is chiefly found in wet meadows and edges of marshes—places where the Cowbirds are not very common.

Sisopygis icterophrys (Vieill.). Yellow-browed Tyrant.

This species is sometimes, though not very frequently, victimized. It usually does not forsake its nest if parasitized but, like the Yellow Warbler (*Dendroica aestiva*) of North America, builds a new floor to the nest thereby burying the unwelcome egg or eggs. Hudson writes that the nest of this flycatcher being rather shallow "the layer of fresh material under which the strange eggs are buried, is built upward above the rim of the original nest, so that this supplementary nest is like one saucer placed within another, and the observer is generally able to tell from the thickness of the whole structure whether any parasitical eggs have been entombed in it or not." As many as three Cowbird eggs have been found buried in one nest of this species.

In Tucumán I found the Yellow-browed Tyrant somewhat uncommon and succeeded in finding only two nests, neither of which was victimized. However, Pablo Girard found a parasitized nest at Manchala, Rio Colorado, Tucumán, November 17, 1925, containing 2 eggs of the Tyrant and one of the Cowbird.

Knipolegus cabanisi (Schulz). Cabanis' Black Tyrant.

I know of but one record. Pablo Girard found a nest of this Tyrant at Tafi Viejo, Tucuman, on October 27, 1925, containing one egg of the owner and one of the Cowbird, *M. b. bonariensis.*

Machetornis rixosa rixosa (Vieill.). "Matero," Short-winged Tyrant.

I found this terrestrial flycatcher to be a fairly common victim of the Shiny Cowbird in Tucumán. However, I have found but five published records. Grant (Ibis, 1912, p. 279) lists this bird as a victim of *Molothrus bonariensis.* Goodall records 3 victimized nests. This Tyrant is very given to using old nests of Ovenbirds (*Furnarius*) and Woodhewers (*Anumbius* and *Synallaxis*) and inasmuch as these nests, particularly those of the Ovenbirds, are frequently visited by the Cowbirds it seems as though the lack of records is due more to paucity of observations than to negative evidence. However, it should not be forgotten that there are few birds of its size more pugnacious than the "matero." Hudson writes that he, " . . . . has seen a pair of *Machetornis* after they had seized a nest, attacked in their turn by a flock of 6 or 8 Bay-wings, but, in spite of the superior numbers, the fury of the *Machetornis* compelled them to raise the siege."

Of ten nests found during the three months I spent in Tucumán, four contained Cowbirds' eggs in addition to those of the "materos." Of these four, three were open nests built by the *Machetornis* themselves while one was in an old Ovenbirds' nest. Of the other six nests found, five were in old nests of woodhewers while one was an open nest built by the flycatchers. It is easier for a parasitic bird to deposit an egg in an open nest than in a domed one, so probably the pugnacity of the *Machetornis* is usually sufficient to keep the *Molothrus* out of nests of the latter type, while in open ones, a few seconds off guard is enough to allow the parasite to lay its egg and get away.

The history of the parasitized nests is as follows:

1. November 9, 1923, Concepción, Tucumán. Nest in a palm, in an old leaf axil about 18 feet up. It contained 1 egg of the Short-winged Tyrant and 3 of the Cowbird, 2 laid by the same individual and 1 by another. The Tyrant's egg and one of the Cowbirds' eggs were broken. Three days later I revisited this nest and found all the eggs had been pecked and the contents spilled or eaten. Several Cowbirds were continuously around the tree for about a week.

2. November 14, 1923, Concepción, Tucumán. Nest in a Eucalyptus, twenty feet from the ground. Contained 1 egg of the Cowbird and none of the owner, while on the ground, underneath the nest was a smashed *Molothrus* egg. Five days later I revisited the nest and found it contained 2 *Molothrus* eggs and none of the Tyrant. The Cowbird eggs were laid by different individuals.

3. November 19, 1923, Rio de Gastone, Tucumán. Nest in an old nest of an Ovenbird, on a horizontal limb of an Acacia tree, about 6 feet up from the ground. It contained two eggs of *Machetornis* and 1 of *Molothrus*. The Ovenbird's nest was broken on the top but whether this was done before the Tyrants took possession or afterwards I cannot say.

4. November 29, 1923, Rio de Gastone, Tucumán. Nest in a fork of a tree, about 6 feet up from the ground. The nest was made of rootlets, straw and dead grasses and was obviously built by the *Machetornis*. It contained 1 egg of the owner and 1 of the Cowbird, both broken. The nest was deserted.

Serpophaga nigricans (Vieill.). Little River—Side Gray Tyrant.

A rare victim.

Grant (Ibis 1912 p. 279) mentions this species in a list of birds known by him to be imposed upon by the Shiny Cowbird. Hudson's comments on this species are somewhat confusing but it seems he found this (or some other) *Serpophaga* victimized at least once. In an earlier paper (P. Z. S., 1870, pp. 671-673), discussing the general behavior of the Cowbird, he states that although their eggs are frequently found in nests of pugnacious birds, the ". . . . eggs are never found in nests of some species that are not at all pugnacious, such as that, for example, of *Serpophaga nigricans*." Some years later (1920, pp. 84-85), in writing of the habits of the young Cowbird, he says that as the nests, ". . . . in which it is hatched, from those of the little *Serpophaga* and Wren to those of *Mimus*, vary so much in size and materials . . . . the young *Molothrus* must have in most of them a somewhat incongruous appearance."

Myiosympotes flaviventris (Orb. et Lafr.). Reed Tyrant.

Hudson (1920, p. 84) records seeing a young Shiny Cowbird being fed and attended by one of these diminutive birds. He writes as follows: "Last summer I noticed a young Cowbird in a stubble field, perched on the top of a slender dry stalk. As it was clamoring at short intervals I waited to see what bird would come to it. It proved to be the diminutive *Hapalocercus flaviventris*, and I was much amused to see the little thing fly directly to its large foster offspring, and, alighting on its back, drop a worm into the upturned, open mouth. After remaining a moment on its singular perch, the Flycatcher flew away, but in less than half a minute returned and perched again on the young bird's back. I continued watching them until the *Molothrus* flew off, but not before I had seen him fed seven or eight times in the same manner."

I know of no other records of this bird being victimized.

Elænia albiceps (Lafr. et Orb.). D'Orbigny's Crested Flycatcher.

Reed (1913) lists this flycatcher as a victim of the Shiny Cowbird in Mendoza. I have heard of no records elsewhere.

Suiriri suiriri (Vieill.). Suiriri Flycatcher.

On November 29, 1923, at Rio de Gastone, Tucumán, I found a nest of this Flycatcher with three eggs of the owners and 1 of the Shiny Cowbird. This is the only record I know of.

Pitangus sulphuratus bolivianus (Lafr.). "Bienteveo."

That this large, pugnacious Tyrant should be victimized by the Shiny Cowbird is surprising and it certainly cannot be but rarely imposed upon. Reed (1913) lists it as a molothrine victim in Mendoza. It is not recorded as such in any other part of the country. During my field work in various parts of Argentine I found the "Bienteveo" abundant everywhere and examined many nests but not one showed any sign of a molothrine visitation.

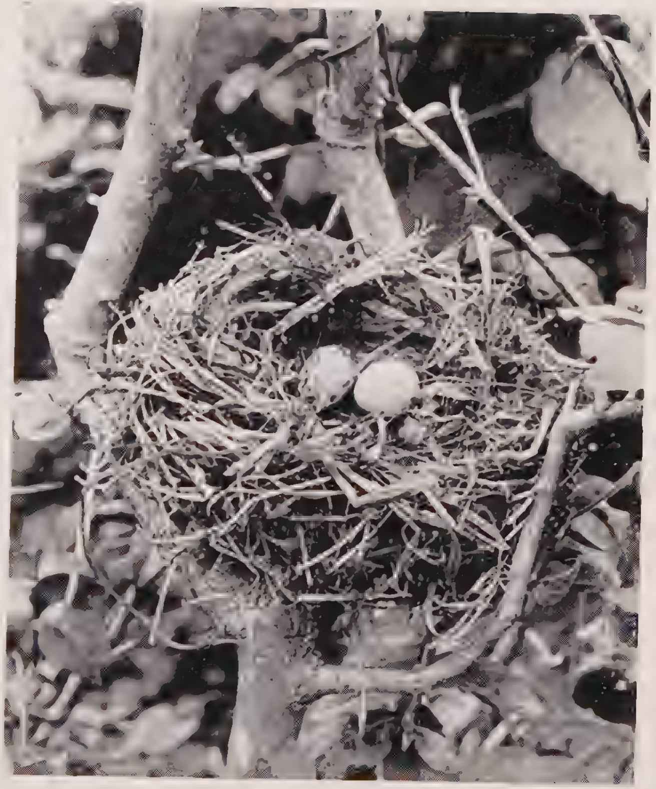
Myiodynastes solitarius (Vieill.). Solitary Flycatcher.

A somewhat uncommon victim of the Shiny Cowbird in Tucumán and not elsewhere recorded as such. Señor Pablo Girard has found it parasitized at Rio Colorado. On December 19, 1923, at Concepción, I found a nest of this Flycatcher with one egg of the owner and two of the Cowbird. This nest was rather unusual in that it was placed in a tangle of vines whereas all the other nests I found of this species were placed in crotches in thorn bushes.

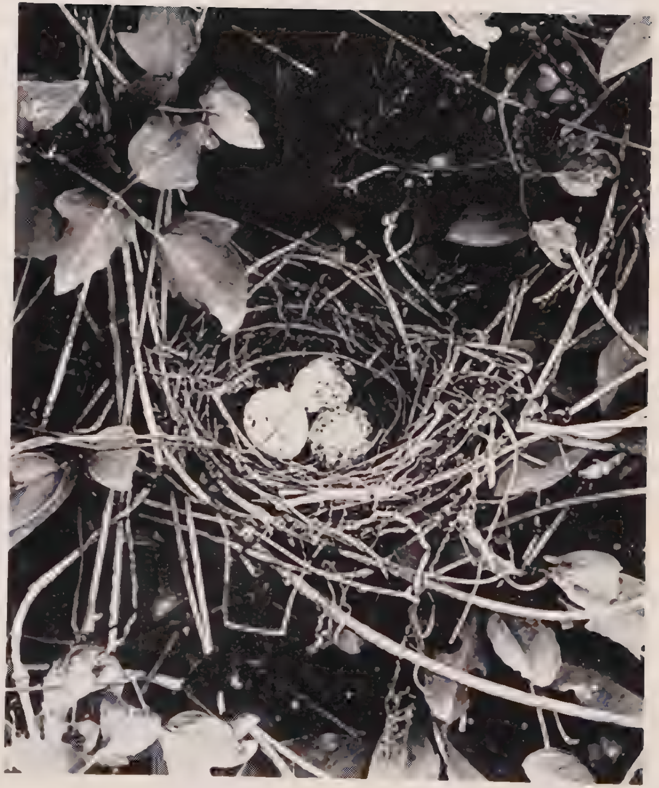
Myiophobius fasciatus fasciatus (Mull.). Little Brown Flycatcher.

On November 22, 1925, at Concepción, Tucumán, I found a nest of this little Flycatcher with two eggs of its own and one of the Shiny Cowbird. The next day all

PLATE VIII.



Nest of Machetornis rixosa with One Egg of the Owner and One of Molothrus bonariensis.



Nest of Myiodynastes solitarius with One Egg of the Owner and Two of Molothrus bonariensis.

the eggs were found pecked and broken and the nest deserted. Girard found a nest at Manchala, Rio Colorado, Tucumán, on January 16, 1925, with 2 eggs of the Flycatcher and one of the parasite. These are the only records I know of.

Pryocephalus rubinus rubinus (Bodd.). Vermillion Flycatcher, Churinche, Pájaro de Fuego.

Hudson (P. Z. S. 1872 p. 809) writes of this brilliant little flycatcher as follows: "After the Churinches' nest is completed the Ventiveo (*Pitangus bellicosus*) and the common Blackbird (*Molothrus bonariensis*) are the troublers of their peace . . . . the female Blackbird is ever on the lookout for a receptacle for her eggs. Seldom, however, does she succeed in gaining admittance to the Churinche's nest, as he is extremely vigilant and violent in repelling intruders. But his vigilance at times avails not; the subtle bird has watched and waited till, seizing a moment when the little scarlet tyrant is off his guard, she drops her surreptitious egg into his nest. When this happens the Churinches immediately leave their nest. . . . ."

Devincenzi (p. 95) lists the Churinche as a molothrine victim in Uruguay.

I know of few definite records but the above accounts were based on at least two such instances. I found but few nests of this bird, none of which were victimized. The Churinche is probably rarely parasitized.

Goodall (Bull. Brit. Orn. Cl., 1923, xliii, p. 66) found a nest of the Vermillion Flycatcher with three eggs of the owner and one of the Cowbird. In this case the female Flycatcher was sitting on the eggs.

Empidonomus a. aurantio-atrocristatus (Lafr. et Orb.). Black and Gold Crested Tyrant.

The Black and Gold Crested Flycatcher is one of the less common victims of the Shiny Cowbird. On November 5, 1923, at Rio de Gastone, Tucumán, I found a nest of this species containing three eggs of the owner and one of *Molothrus*. The nest was about ten feet up in an acacia tree. I found altogether some six nests of this species of which the above was the only one parasitized. At Rio Colorado, in the same province, some fifty miles south of Concepción, Señor Pablo Girard has found this flycatcher to be imposed upon by the Cowbird.

Tyrannus melancholicus melancholicus Vieill. Bellicose Tyrant.

The Bellicose Tyrant is a not uncommon victim of the Cowbird and may be quite heavily parasitized in some localities. In Entre Rios, Holland (Ibis 1892 p. 200) writes of this flycatcher as follows: "I have taken eggs of *Molothrus bonariensis* from its nest which were spotted similarly to those of the Tyrant." The same writer, in another paper (Ibis 1890 p. 426) records a nest of this species at Estancia Santa Elena, Entre Rios, with 2 eggs of the owner and 2 of the Cowbird.

In Tucumán, Señor Girard has found this bird to be parasitized near Rio Colorado, and at Concepción, some fifty miles south of there, I found five nests of the Bellicose Tyrant of which three were victimized.

The first of these three was found on November 23, 1923, and contained 1 egg of the Tyrant and 1 of the Cowbird; the second, found on November 29, 1923, contained 2 eggs of the owner and 1 of the Cowbird, while the third was found on December 15, 1923, and contained 1 young Cowbird ready to leave.

Hudson was of the opinion that this species would be immune from molothrine molestation because of its size and pugnacity, but as the above data shows, not only is the bird imposed upon but it hatches the strange egg and rears the young Cowbird. The Bellicose Tyrant nests in bushes and acacia trees at an elevation of from 4 to 15 feet and makes a crude nest in a crotch like that of Couch's Kingbird (*Tyrannus melancholicus couchii*) of southern Texas.

All in all, ten records have come to my notice.

Muscivora tyrannus (Linn.). Tijerita—Fork-tailed Flycatcher.

This dainty Flycatcher is one of the commonest victims of the Shiny Cowbird. As many as nine eggs of the parasite have been found in one nest of this bird together with one egg of the builder. Hudson (P. Z. S., 1874, p. 154) tabulated the contents of ten nests of the "tijerita" taken in December. Two nests contained three eggs each of the owner and none of the Cowbird, one contained only two eggs, both Cowbird's, one had one rightful egg with three parasitic ones, two had four Cowbird eggs, each with none of the Flycatcher, one had four Cowbird eggs and one of its own, two had five Cowbird eggs each, together with one egg of the "tijerita" in one case and two in the other, while one nest had eight Cowbird eggs and one of the builder.

"The ten nests contained a total of forty-seven eggs, twelve of the Scissor-tails and thirty-five of the Cowbirds. It is worthy of remark that the *Milvulus* breeds in October or early in November, rearing only one brood; so that these ten nests found late in December were of birds that had lost their first nests. Probably three-fourths of the lost nests of *Milvulus* are abandoned in consequence of the confusion caused in them by the Cowbirds."

The extent to which this species is victimized varies geographically. Judging from Hudson's accounts it must be parasitized more commonly in the province of Buenos Aires that I found it in Tucumán. In the latter province, during some three months' field work, I found twelve nests of this bird, four of which were victimized.

Grant (Ibis 1912, p. 279) lists this species as a molothrine victim and Holland (1890, p. 426) states that in Entre Rios it is, ". . . . greatly harassed in its nesting by *Molothrus bonariensis*."

The Fork-tailed Flycatcher is a very pugnacious bird, attacking and beating off birds of prey, much after the fashion of the Scissor-tailed Flycatcher of southern Texas or the Kingbird further north, and yet it is imposed upon by the Cowbird more than most species. In this connection it is of interest to note that the Scissor-tail is hardly known to be molested by the Cowbird (*M. ater*) in North America, and the Kingbird is a rarely victimized species.

Fifty-seven records have come to my notice.

Phœoprogne tapera (Linn.). Tree Martin.

This swallow is listed as a molothrine victim at Ajo, province of Buenos Aires, by Gibson. Were it recorded by anyone less careful and reliable in his statements, I should doubt its validity. *Phœoprogne tapera*, the common Martin of eastern Argentina, breeds almost exclusively in old nests of the Ovenbird or "hornero." The latter is a common victim of the Cowbird and it may be that the parasitic egg was laid in the nest before the Martins took possession, in which case the swallows could hardly be said to have been parasitized by the Cowbirds. However, it is just as likely that the Cowbird's egg was laid after the new tenants had taken up their residence. I looked through the late Mr. Gibson's notebooks when I was at his estancia and failed to find any data about this record. *Phœoprogne tapera* is a very pugnacious bird and would normally be exempt from molothrine molestation on this account.

Tachycineta leucorrhoa (Vieill.). White-rumped Tree Swallow.

Holtz (Journ. f. Orn. 1870, pp. 11; 15) records an egg of *Molothrus bonariensis* from a nest of this swallow together with two of the owner. Locality and date are not given, but the locality seems to have been in the neighborhood of Buenos Aires.

Troglodytes musculus (Naum). House Wren.

Hudson, Gibson, and Grant all list this Wren as a victim of the Shiny Cowbird in the province of Buenos Aires. It is probably victimized very seldom, and, to judge by comparison with the record of *Troglodytes œdon* and *Molothrus ater* in North America, it should be a rare victim.

Two races of this Wren are victimized by the Cowbird:

Trogdolytes musculus guarixa (Puch).

Troglodytes musculus hornensis (Less.).

Holtz (Journ. of Ornith., 1870, p. 15) records 8 victimized nests, 3 of which contained four eggs each of the Cowbird.

Troglodytes audax (Tschudi). Tschudi's House Wren.

Taczanowski (1884, pp. 422-424) writes that Stolzmann and Jelski found eggs of *Molothrus bonariensis occidentalis* in nests of this Wren in Peru.

Troglodytes clarus (Berlepsch and Hart.). Trinidad Wren.

Leotaud, in his account of the birds of Trinidad, writes that the commonest victim of the Cowbird (*Molothrus bonariensis minimus*) is the Wren *Troglodytes rufulus.* Berlepsch and Hartert have since studied this Wren and have named the Trinidad bird *clarus* (Nov. Zool., 1902, p. 8).

Heleodytes balteatus (Baird). Baird's Marsh Wren.

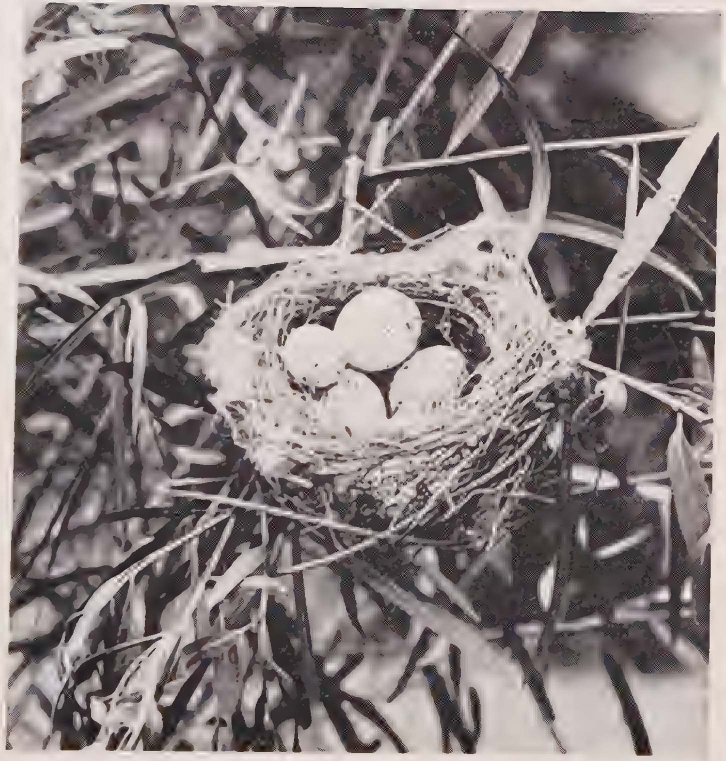
In Peru this bird is victimized by the local race of the Cowbird, *M. bonariensis occidentalis,* according to Taczanowski (1884, pp. 422-424).

Turdus rufiventris (Vieill.). Red-bellied Thrush.

This thrush is victimized occasionally in the province of Tucumán. Pablo Girard has taken Cowbird eggs from nests of this bird at Rio Colorado and I saw a young Cowbird being fed by a Red-bellied Thrush at Concepción. Grant (Ibis, 1912, p. 279) lists this bird as a victim of the Shiny Cowbird. Wetmore (Bull. 133 U.S.N.M., 1926, p. 356) found a nest of this thrush at Los Yngleses, southern Buenos Aires, on October 30, 1920, containing six eggs, three of which were Cowbird's.

Turdus leucomelas (Vieill.). Dusky Thrush.

Señor Girard has found eggs of *Molothrus bonariensis* in nests of this species at Rio Colorado, Tucumán.



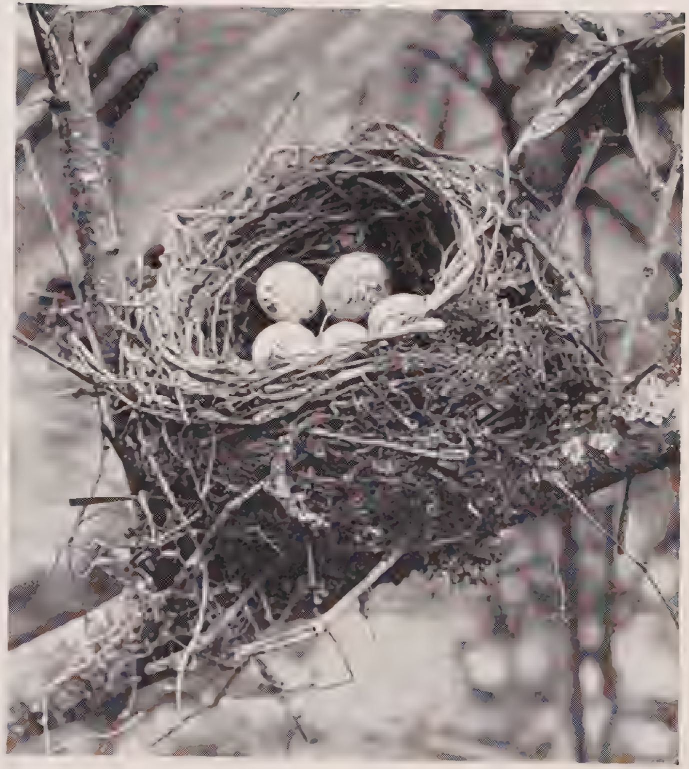


PLATE IX.

Nest of Sporophila caerulescens with One Egg of the Owner and Three of Molothrus bonariensis.

Nest of Turdus amaurochalinus with Two Eggs of the Owner and Three of Molothrus bonariensis.

Turdus nigriceps (Cab.). Dusky-Headed Thrush.

One record. Pablo Girard found a nest of this thrush at Tafi Viejo, Tucumán, October 30, 1913, with two eggs of the owner and one of the Cowbird.

Turdus amaurochalinus (Cab.). "Zorzal blanco."

At Concepción, Tucumán, I found this Thrush to be quite commonly victimized by the Shiny Cowbird. Out of eight nests found, five contained eggs of *Molothrus bonariensis* as well as of the owner. It is rather strange that Señor Girard, at Rio Colorado only some fifty miles to the south, has never found this species parasitized.

The parasitized nests found were as follows:

1. November 14, 1923, Concepción. Nest seven feet up in a large bush, contained three eggs of the Thrush and one of *M. bonariensis.* Left it to watch developments, but a heavy storm on the night of November 16 broke it up, smashing all the eggs.

2. November 22, 1923, Concepción. Nest contained three eggs of the owner and two of the Cowbird. This nest was first found two days before (November 20), when it contained only one egg—a thrush's.

3. December 3, 1923, Rio de Gastone, Concepción. Nest in a bush, contained two eggs of the Thrush and one of the Cowbird.

4. December 10, 1923, Concepción. Nest in a bush about six feet up; contained one egg of the Thrush, one of the Cowbird and one young Cowbird about two days old.

5. December 20, 1923, Concepción. Nest about seven feet up in a large bush; contained one egg of the owner, and four of *Molothrus bonariensis.*

Mimus triurus (Vieill.). White-banded Mockingbird.

Reed has listed this bird as a victim of *Molothrus bonariensis* in Mendoza. Goodall (Bull. Brit. Orn. Cl., 1923, xliii, p. 68) records twenty-five victimized nests of the White-banded Mockingbird collected at Estancia "La Ethel," Buena Esperanza, province of San Luis, during 1912. This species was very abundant in that place and most of its nests were parasitized. Wetmore (Bull. 133, U.S.N.M., 1926, p. 351) found a nest of this bird at Victoria, Pampa, on December 26, 1920, with six eggs, one of which was a Cowbird's.

Mimus saturninus modulator (Gould). "Calandria."

This Mockingbird is a common victim of the Shiny Cowbird. Gibson found it to be imposed upon in the Cape San Antonio region, province of Buenos Aires. Miller (1917, p. 590), at Tilcara, Salta (?), found two nests of this bird, as follows:

1. February 10—Nest made of grasses and placed in the old nest of a *Synallaxis,* in a cactus about five feet up. Three eggs of the owner and one of Cowbird which somewhat matches the mockingbird's eggs in shape and coloration. Incubation advanced in all.

2. February 12—Apparently a deserted nest, in the center of a large thorn bush, three feet above the ground. Contained fourteen eggs of *M. bonariensis,* all addled, apparently the product of at least seven birds.

In the collection of Mr. Stewart Shipton there is a nest of this bird with four eggs of the owner and two of the Cowbird taken at Toro Muerte, Tucumán, December 27, 1910.

Grant (Ibis, 1912, p. 279) lists this bird as a victim of the Cowbird, but gives no definite locality.

On November 30, 1923, at Rio de Gastone, Tucumán, I found a nest of this "calandria" about five feet up in a bush, containing two eggs of the owner and one of the Cowbird. The nest was built on top of the ruins of an old Woodhewer's nest. The next day one of the Mockingbird's eggs was gone.

In Entre Rios I found this bird to be common but I arrived there after it was finished breeding. Mr. C. H. Smyth, a resident egg collector at Santa Elena, in that province, told me that nearly every nest of the Mockingbird contains at least one egg of the Cowbird and frequently more. He found one nest that contained four eggs of the owner and nine of the *Molothrus*. *Mimus saturninus modulator* is one of the most heavily victimized birds in that part of Entre Rios.

Mimus patagonicus (Lafr. et. Orb.). Patagonian Mockingbird.

This Mockingbird has been recorded as a victim of the Shiny Cowbird in Mendoza by Reed and in Tucumán by Girard.

Mimus thenca (Molina). Chilean Mockingbird.

Rahmer (1913, pp. 207-209) writes that in Chile the *Molothrus bonariensis* lays in the nests of this Mockingbird.

Polioptila dumicola (Vieill.). Gnatcatcher.

This little bird, much like the Gnatcatcher of eastern North America, has been recorded by Hudson as a victim of the Shiny Cowbird. However, his record is neither definite nor explicit in any detail and may be considered doubtful. In the course of my Argentine field work I found seventeen nests of this bird, none of which was victimized.

Vireosylva chivi chivi (Vieill.). Chivi Vireo.

When one considers how abundantly the common Vireos of North America are parasitized by *Molothrus ater* it is surprising to find that this species is not commonly victimized by *M. bonariensis.* This Vireo makes a nest like that of a Red-eyed Vireo and in similar positions. It has been recorded as a molothrine victim by Girard; and Venturi (ex, Hartert and Venturi, 1909, p. 184) found a nest of this species with three eggs of the Vireo broken on the ground and five eggs of *M. bonariensis* in their place in the nest.

Cyclarhis gujanensis viridis (Vieill.). Azara's Greenlet-Shrike.

This large Vireo is a rather uncommon victim of the Shiny Cowbird. Girard has taken *Molothrus* eggs from its nests in Tucumán.

Anthus lutescens lutescens Puch. Rufous Pipit.

At Concepción, Tucumán, I found a nest of this little Pipit containing an egg of the Shiny Cowbird as well as three of the Pipit. This is the only record I know of. The eggs and both old birds are now in the Museum of Comparative Zoölogy.

Anthus rufus peruvianus (Nicholson). Peruvian Pipit.

This Pipit is listed by Stolzmann and Jelski in Tacanowski's "Ornithologie de Perou" (pp. 422-424) as a victim of the Cowbird, which, in that region, is of the subspecies *occidentalis*. In the environs of Lima it is *Anthus rufus* which is destined to be the main foster-parent of the Cowbird. Jelski found from one to four *Molothrus* eggs in nests of this bird.

Anthus correndera (Vieill.). Cachila Pipit.

The Cachila is stated by Hudson to be commonly victimized in parts of the province of Buenos Aires, and Gibson has also listed it as a victim of the Cowbird in the same province. Grant (Ibis, 1912, p. 279) mentions this species in his list of molothrine victims. Reed found it parasitized in Mendoza.

The nests of this bird are rather hard to find, and are much like those of the meadowlark but on a much smaller scale.

Geothlypis æquinoctialis cucullata (Lath.). Hooded Yellow-throat.

This warbler, the Argentine counterpart of the Maryland Yellowthroat (*Geothlypis trichas*) of North America, has been recorded as a molothrine victim in northwestern Argentina, in the provinces of Tucumán and Salta. Girard has collected parasitized clutches in the former province while Miller (1917, p. 589), at Rosario de Lerma in Salta, found, on January 16, 1916, a small grass nest of this species placed at the base of a low bush, containing three eggs of the warblers and two of the Cowbird, all fresh. One of the warbler's eggs had holes pecked in it.

Thraupis sayaca sayaca (Linn.). Blue Tanager.

This pale blue Tanager seems to be an infrequent victim of the Shiny Cowbird. In the collection of Mr. Stewart Shipton, at Concepción, Tucumán, there is a nest of this species containing one egg of the Tanager and one of the Cowbird. The nest and eggs were collected at Alto Verde, Tucumán, on November 25, 1909. Señor Girard has also recorded this bird as a molothrine victim in Tucumán. I have heard of no records elsewhere.

Thraupis episcopus nesophilus (Riley). Bishop Tanager.

Cherrie (Orn. Orinoco Region, p. 175) records a victimized nest of this bird at Caicara, Venezuela, May 7, 1907. It contained two eggs of the Tanager and one of the Cowbird (*M. b. venezuelensis*).

Thraupis bonariensis (Gm.). Blue and Yellow Tanager.

This tanager is not infrequently victimized by the Shiny Cowbird. Girard has found it parasitized in Tucumán and Miller (1917, p. 587), in Rosario de Lerma, province of Salta, Argentina, found two victimized nests of this species on January 10, 1916. The first nest was in a clump of mistletoe, six feet up; contained two eggs of the owners with incubation advanced, and three eggs of *M. bonariensis*, one with incubation advanced and two addled. "The five eggs filled the nest and it was doubtless impossible for the bird to cover them all." The other nest, ". . . . discovered the same day, was in the top of a vine-covered sapling, seven feet up, and contained one young tanager and one young cowbird. Apparently both were newly hatched, but the latter was twice the size of the former and a good deal more active. The nest also contained two cowbird eggs, one fresh and one with incubation advanced."

Thlypopsis sordida sordida (Lafr. et Orb.). Orange-headed Tanager.

Señor Pablo Girard has found this species to be victimized by the *Molothrus bonariensis* in Tucumán.

Pheucticus aureiventris (Orb. et Lafr.). Orange-vented Grosbeak.

This bird has been recorded as a victim of the Cowbird in Tucumán by Señor Girard.

Piezorhina cinereus Lafr. Cinereous Finch.

In Peru, according to Taczanowski (1884, pp. 422-424), this species is victimized by the local race of the Cowbird, *Molothrus bonariensis occidentalis.*

Cyanocompsa cyanea argentina (Sharpe). Argentine Blue Grosbeak.

Girard has found this bird to be victimized by the Cowbird in Tucumán. In my field work I came across this species several times but never had the good fortune to find a nest.

Saltator cœrulescens cœrulescens (Vieill.) Papitero, Blue Saltator.

In Tucumán I found this species to be not uncommonly imposed upon by the Cowbird. Of nine nests that I found containing eggs, two contained an egg each of the Shiny Cowbird in addition to three of the Saltator. This peculiar finch-like bird lays bright green or very greenish-blue eggs scrawled with black at the large end, very different from the eggs of the Cowbird in color and also much larger than those of the parasite. Nevertheless, this species incubates and rears young intruders but whether its own young survive or not I cannot say. I have seen adults of this Saltator feeding fully fledged, three quarters grown Cowbirds on several occasions but in none of these instances were there any young *"papiteros"* visible.

Pablo Girard has also found this species victimized in Tucumán.

Dinelli (El Hornero, III, 1924, p. 255) once collected a Cowbird's egg from a nest of a Blue Saltator. He gives no exact locality but probably was in the same province as the cases mentioned above—Tucumán.

Although I feel confident that it is victimized elsewhere as well, I have heard of no actual records in other parts of the country.

Saltator aurantiirostris (Vieill.) Orange-billed Saltator.

A rather common host as far as my experience and published records show. On January 30, 1924, at Santa Elena, Entre Rios, I saw a fully grown young Shiny Cowbird being fed by one of these *"Juan chiviros."*

In Tucumán I found this Saltator somewhat uncommon and located no nests, but Señor Pablo Girard has found it to be parasitized in that province.

Sporophila cœrulescens (Bonn. et Vieill.). Screaming Finch.

On December 10, 1923, at Concepción, Tucumán, I found a nest of this bird about five feet up from the ground, partly suspended somewhat vireo-like at the tip of a slender branch of a large bush. It contained one egg of the finch and three of the parasite. Hudson once found a young *Molothrus* in a nest of this little finch. Girard found two victimized nests at Tucumán City; one with one egg of the owner and two of the Cowbird; the other with one egg of the finch and three of the parasite.

Spinus barbatus (Mol.). Black-chinned Siskin.

This finch is recorded by Gibson as a victim of the Cowbird in the Cape San Antonio region of the province of Buenos Aires.

Spinus ictericus ictericus (Licht.). Black-headed Siskin.

Gibson (Ibis 1880, p. 15) lists this species as a victim of *Molothrus bonariensis* in the Cape San Antonio district of the province of Buenos Aires.

Sicalis pelzelni (Scl.). Yellow House Sparrow.

The Yellow House Sparrow breeds in old nests of certain Woodhewers, particularly *Synallaxis spixi,* and, in common with most birds breeding in these structures, is fairly free from the attentions of the Shiny Cowbird. On November 24, 1923, at Rio de Gastone, Tucumán, I found a nest occupied by *Sicalis pelzelni* containing two eggs of the Sicalis and one of *Molothrus bonariensis.* Devencenzi (p. 95) lists this bird as a victim of the Cowbird in Uruguay.

Sicalis arvensis arvensis (Kittl.). Misto Yellow Finch.

The present species is listed by Gibson as a victim of the Shiny Cowbird at Ajo, province of Buenos Aires. Devincenzi (p. 95) lists it as a molothrine victim in Uruguay. I know of no other mention of it in this connection.

Sicalis luteiventris (Meyen). Meyen's Yellow Finch.

Holtz (Jour. f. Orn., 1870, p. 15) records two eggs of *Molothrus bonariensis* from a nest of this finch. Data are lacking but the locality probably was in the province of Buenos Aires.

Pseudochloris aureiventris (Phil. et Landb.). Yellow-bellied Ground Finch.

This species is recorded as a victim of *Molothrus bonariensis* in Mendoza by Reed. I have not heard of it being parasitized elsewhere.

Atlapetes citrinellus (Cab.). Yellow-striped Finch.

One record; a nest found by Pablo Girard at Tafi Viejo, Tucumán, November 9, 1925, containing one egg of the owner and one of *Molothrus b. bonariensis.*

Coryphospingus cucullatus (P.L.S. Mull.).

Skinner (Oologist's Record, III, No. 1, 1923, p. 21), in listing some eggs collected in the state of Minas Geraes, Brazil, records three sets of *Coryphospingus cucullatus,* one of which contained two eggs of *Molothrus bonariensis.* I know of no other record.

Brachyspiza capensis (P.L.S. Mull.). Chingolo Song Sparrow.

This ubiquitous little sparrow, South American equivalent of our Song Sparrow (*Melospiza melodia*) is by all means the most usual victim of the Shiny Cow-

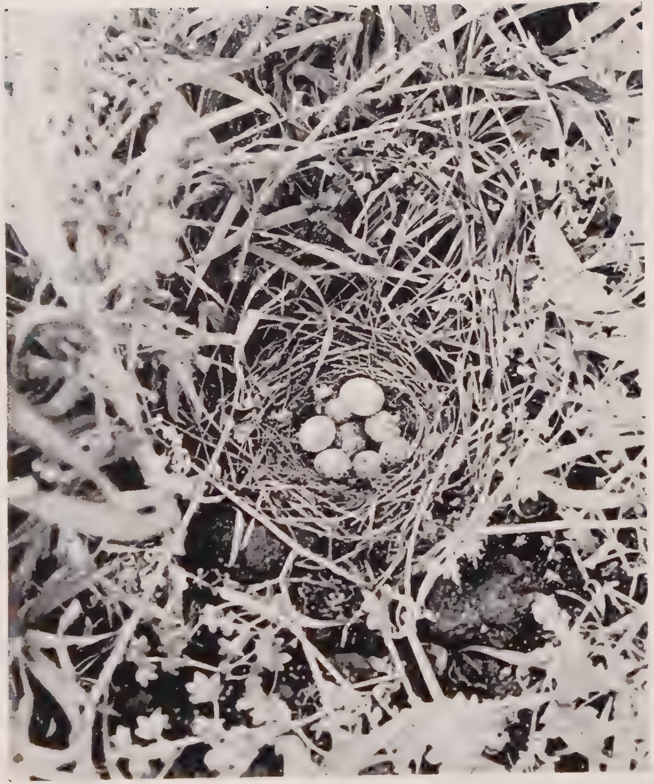
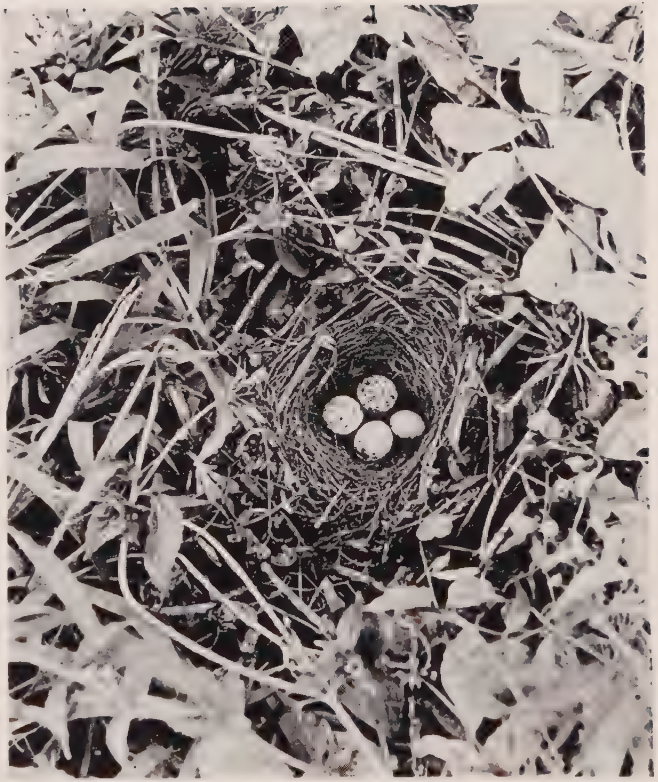


PLATE X.

Nest of Brachyspiza capensis with One Egg of the Owner and Seven of Molothrus bonariensis.



Nest of Brachyspiza capensis with One Egg of the Owner and Three of Molothrus bonariensis.

bird and probably more young Cowbirds are reared by this species than by the four next commonest victims combined. In the course of my field work I found thirty-three nests of this species, of which twenty-four contained one or more eggs of the Cowbird, four were empty, and only five which contained eggs were not parasitized. The largest number of parasitic eggs that I found in any one nest was eight together with one egg of the Sparrow. The nests of this species are quite similar to those of the Song Sparrow but slightly smaller and built of finer materials and are seldom far from the ground. In fact, while I found several in low shrubs and bushes, and once even eight feet from the ground, the majority were right on the ground at the base of large weeds or small shrubby plants. This Sparrow is victimized in all sections of Argentina, from Buenos Aires to Mendoza, from Entre Rios to Tucumán and Salta. The subspecies of this Sparrow have not been worked out satisfactorily as yet but the Entre Rios bird is *Brachyspiza capensis argentina* and the Tucumán form is probably the same; the Mendoza bird is *chilensis;* that in Salta is *hypoleuca.*

Venturi informs me that in Tucumán he has known the Chingolo to throw out the Cowbird's eggs, but only rarely does this happen.

Dinelli (El Hornero, III, 1924, p. 257) writes that the Shiny Cowbird seems to have a special liking for the nests of this species. His observations were made in Tucumán and adjacent provinces.

Taczanowski (1884, pp. 422-424) writes that in Peru Stolzmann and Jelski found this bird to be a victim of the Cowbird—*M. bonariensis occidentalis.* Skinner (1923, p. 21) states that nine out of ten nests collected in Minas Geraes, Brazil, contained eggs of *M. b. bonariensis.* The Peruvian bird is *B. c. peruviana.*

Over one hundred records have come to my notice. The Argentine records are distributed among the following provinces: Buenos Aires, Entre Rios, Tucumán, San Luis, Cordoba, Mendoza, Salta, Santa Fé, and Santiago del Estero.

The Bolivian race *pulcayensis* is also victimized.

Poospiza melanoleuca melanoleuca (Orb. et Lafr.). White-breasted Warbling Finch.

This little Finch has been recorded as a molothrine victim in Tucumán by Señor Girard. I have never found any nests of this species and know of no other records. Girard's records are as follows:

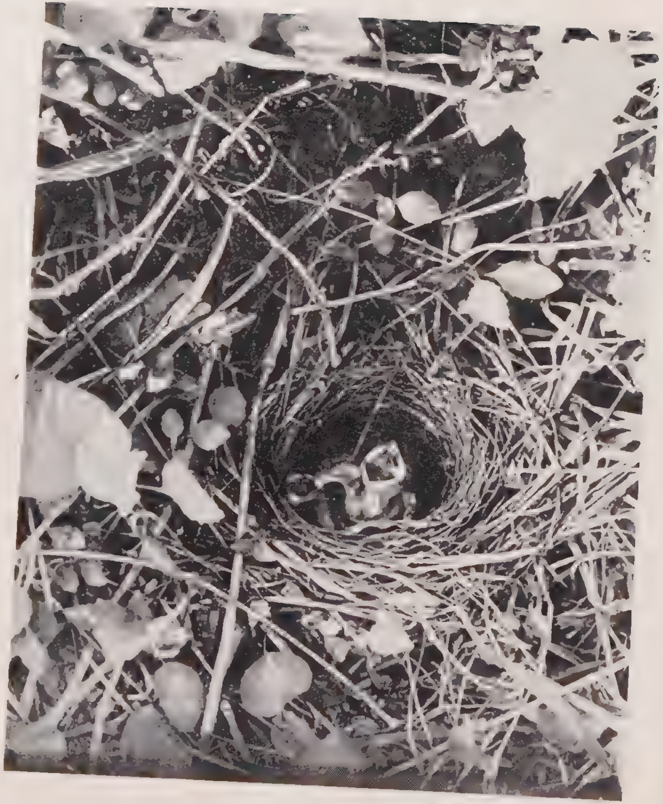
1. Manchala, Rio Colorado, Tucumán; January 1, 1925; one egg of the owner and one of *M. bonariensis.*
2. Manchala, Rio Colorado, Tucumán, December 6, 1925; two eggs of each.

Poospiza whitii (Scl.). White's Warbling Finch.

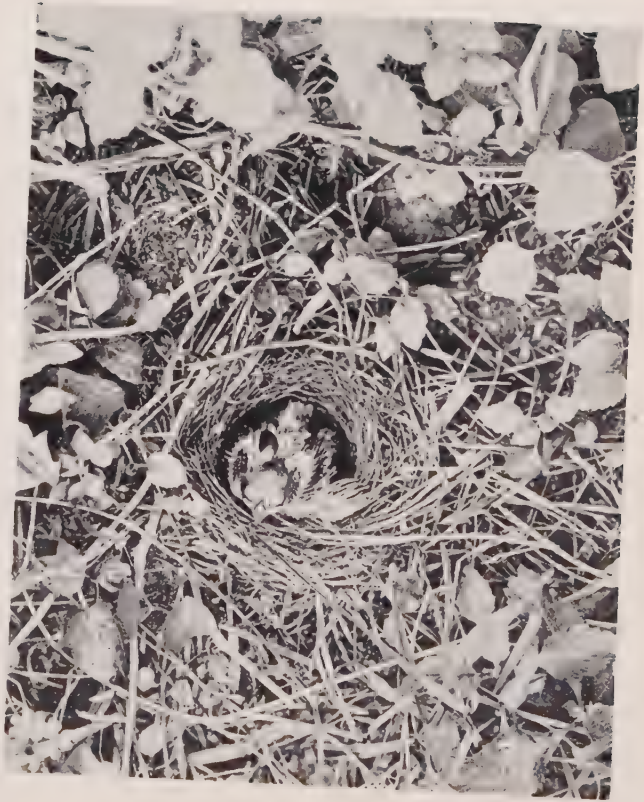
I know of but two records of this species as a molothrine victim. Miller (1917, p. 589) found a nest on January 15, 1916, at Rosario de Lerma, Salta, northwest Argentina, containing two eggs of the owners and one of *Molothrus bonariensis.* Incubation was well advanced in all of them. The nest was in a small bush, eighteen inches up.

Wetmore (Bull. 133, U.S.N.M., 1926, p. 386) records shooting a juvenal Cowbird that had a *Poospiza personata* as foster-parent. However, he does not mention *P. personata* in his annotated list of birds observed in Argentina, as it is a synonym of *whitii.*

PLATE XI.



Nest of Brachyspiza capensis with Two Young Molothrus bonariensis (Two and Four Days Old Respectively).



Nest of Brachyspiza capensis with a Six Day Old Molothrus bonariensis.

Poospiza nigrorufa (d'Orb. et Lafr.). White-cheeked Warbling Finch.

This strikingly colored finch has been listed by Gibson as a victim of the Shiny Cowbird in the Cape San Antonio region, province of Buenos Aires. I know of no records elsewhere.

Myiospiza humeralis tucumanensis (Bangs and Penard). Tucumán Finch.

I know of but one case of the Cowbird parasitizing this bird. This was recorded by Dinelli (El. Hornero, III, 1924, p. 258) in northwestern Argentina, probably Tucumán. The nest contained two eggs of the Cowbird. It was found in January, 1903.

Myiospiza humeralis dorsalis (Ridgway). Cordoba Finch.

Goodall (Bull. Brit. Orn. Cl., 1923, xliii, p. 68) lists what seems to be this bird as a victim of *Molothrus bonariensis bonariensis* in the Cordoba-San Luis district of Argentina where he found one victimized nest. He calls the victimized bird *Coturniculus peruanus,* which is apparently a synonym at that point for *Myiospiza humeralis dorsalis.*

Saltatricula multicolor (Burm.). Many-colored Finch.

This handsome Finch has been recorded as a victim of the Shiny Cowbird at Rio Colorado, Tucumán, by Señor Girard.

Embernagra platensis (Gm.). "Verdon."

This Finch lives in grassy fields and hides its nest so well that Hudson was of the opinion that the Shiny Cowbird probably never finds it and consequently is not able to parasitize it. However, other observers have shown this to be mistaken. Gibson listed this bird as a molothrine victim in the Cape San Antonio region, Buenos Aires, and Holland, at Estancia Santa Elena, Entre Rios, makes two statements concerning it, the earlier being contradicted by the later one. In 1892 (Ibis, p. 197) he wrote of *Embernagra platensis*—"Eggs five in number, rarely with parasitical eggs in the nest," while three years later (Ibis, 1895, p. 215) he wrote that "*Molothrus bonariensis* constantly lays its eggs in these nests." Goodall found four victimized nests of this bird in Cordoba and San Luis.

I never found this species very common anywhere and never succeded in finding a nest.

Diuca diuca (Mol.). Diuca Finch.

Reed records this bird as a victim of the Shiny Cowbird in Mendoza.

Rahmer (1912, pp. 207-209) writes that in Chile the *Molothrus bonariensis* lays in the nests of this bird.

Diuca minor Bonaparte. Lesser Diuca Finch.

Wetmore (Bull. 133, U.S.N.M., 1926, p. 409), found a nest of the Lesser Diuca Finch in an old nest of *Anumbius* at Victoria, Pampa, at the end of December, 1920, containing one egg of the owner and one of the Shiny Cowbird, both heavily incubated. Goodall (Bull. Brit. Orn. Cl., 1923, xliii, p. 68) found three victimized nests of this Finch in San Luis.

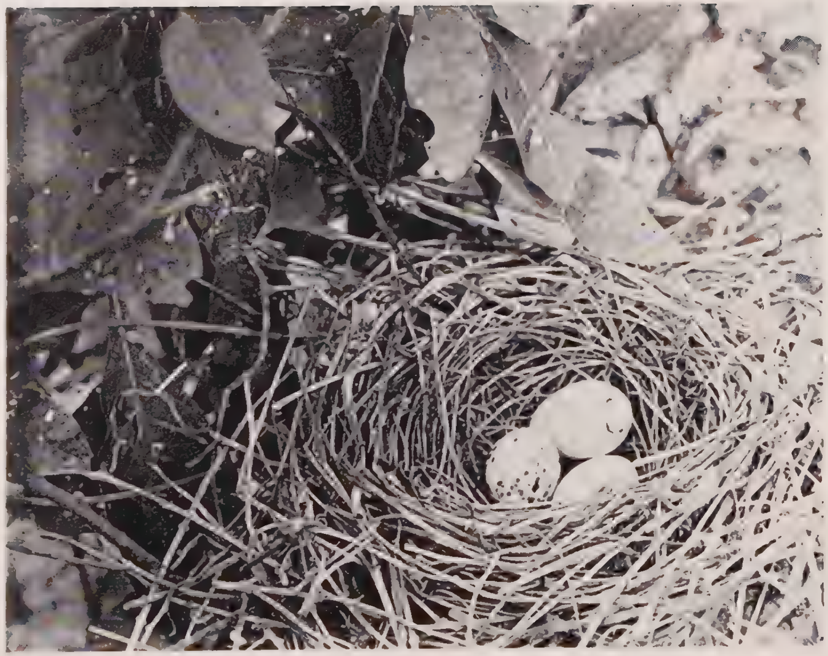
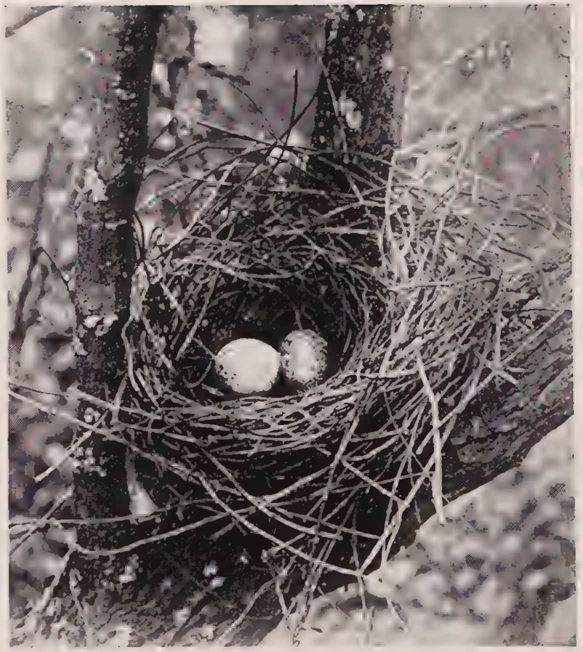


PLATE XII.

NEST OF SALTATOR COERULESCENS WITH TWO EGGS OF THE OWNER AND ONE OF MOLOTHRUS BONARIENSIS.



NEST OF PAROARIA CUCULLATA WITH ONE EGG OF THE OWNER AND ONE OF MOLOTHRUS BONARIENSIS.

Paroaria cucullata (Lath.). Brazilian Cardinal.

This Cardinal is victimized by the Shiny Cowbird in Tucumán. Señor Pablo Girard has recorded it as a molothrine victim at Rio Colorado and I found a nest of this species at Concepcion on December 3, 1923, containing one egg of the Cardinal and one of the Cowbird, both with incubation advanced. I found three nests of this species but this was the only one parasitized. I have heard of no records elsewhere in Argentina.

Agelaioides badius (Vieill.). Bay-winged Cowbird, Muraju, Tordo bayo.

Hudson (1920, p. 107), in his account of the Screaming Cowbird, writes that, "It is wonderful that *M. rufoaxillaris* should lay only in the nests of *M. badius,* but the most mysterious thing is that *M. bonariensis,* indiscriminately parasitical on a host of species, never, to my knowledge, drops an egg in the nest of *M. badius,* unless it be a forsaken nest. Perhaps it will be difficult for naturalists to believe this, for if the *M. badius* is so excessively vigilant and jealous of other birds approaching its nest as to succeed in keeping out the subtle, silent, gray-plumaged, omnipresent female *M. bonariensis,* why does it not also keep off the far rarer, noisy, bustling, conspicuously colored *M. rufoaxillaris,* I cannot say. The only explanation that has occurred to me is that *M. badius* is sagacious enough to distinguish the eggs of the common parasite, and throws them out of its nest. But this is scarcely probable for I have hunted in vain under the trees for the ejected eggs, and I have never found the eggs of *M. badius* with holes pecked in the shells, which would have been the case had *M. bonariensis* intruded into the nest."

This all seems very puzzling and, in fact, it was one of the first points I wished to get data on when I went to Argentina, and the explanation was arrived at more by negative than by positive evidence.

A. badius breeds more largely in Woodhewers' nests than in any others and although *M. bonariensis* evinces a good deal of interest in such nests it rarely lays in them. During the course of my South American field work I examined over three hundred nests built by Woodhewers and in only one, a nest occupied at the time by *Sicalis pelzelni,* did I find an egg of the *M. bonariensis.* So then the partiality of the Bay-wing for nests of a type generally left unmolested by the Shiny Cowbird accounts in part for the former's freedom from the attentions of the latter. Another factor, which I consider even more important, is the fact that most of the *M. bonariensis* are through laying before the breeding season of *A. badius* reaches its height. The breeding seasons of the two species do overlap but the majority of the individuals of the one are finished laying before the most of the individuals of the other are started. I found this to be the case in Tucumán and Entre Rios and I notice that Miller (1917, p. 591), at Rosario de Lerma, province of Salta, found no nests of *A. badius* until the end of the season, that is not until the end of February while the latest eggs of *M. bonariensis* taken by him in the same locality were laid before January 15.

Thus, the chances of the Bay-wing being victimized by the Shiny Cowbird are rather small, but not small enough to render it impossible. In fact, Señor Pablo Girard has recorded the Bay-wing as a victim of *M. bonariensis* at Rio Colorado, Tucumán, and Grant (Ibis, 1912, p. 279) lists it as a victim of the Shiny Cowbird. It is certainly a rare victim of the latter Cowbird.

Agelaius thilius (Mol.). Yellow-shouldered Blackbird.

At Cape San Antonio, Buenos Aires, Gibson found this species to be considerably imposed upon by *Molothrus bonariensis.* While at his estancia at Ajo I looked through his notebooks and found that he had taken eggs of the Shiny Cowbird from four nests of this blackbird, one egg of the parasite in each case. Girard found a nest at Manchala, Rio Colorado, Tucumán, December 30, 1925, containing one egg of the owner and four of the Cowbird.

Agelaius flavus (Gmel.). Yellow-headed Marsh Blackbird.

Goodall (Bull. Brit. Orn. Cl., 1923, xliii, p. 68) records a victimized nest of this bird from the Cordoba-San Luis district of Argentina.

Agelaius ruficapillus Vieill. Red-headed Marsh Bird.

In the collection of Mr. Stewart Shipton at Concepción, there is a nest of this blackbird containing three eggs of the owner and two of the Shiny Cowbird. The nest was collected at Rio de Gastone, Tucumán, on December 28, 1909. I have data on fifteen other victimized nests from Simoca and Manchala, (both in Tucumán) as follows:

1 nest with 1 egg of the owner and 1 egg of the Cowbird
1 nest with 1 egg of the owner and 2 eggs of the Cowbird
2 nests with 1 egg of the owner and 3 eggs of the Cowbird
1 nest with 2 eggs of the owner and 1 egg of the Cowbird
2 nests with 2 eggs of the owner and 2 eggs of the Cowbird
2 nests with 2 eggs of the owner and 3 eggs of the Cowbird
3 nests with 3 eggs of the owner and 1 egg of the Cowbird
3 nests with 3 eggs of the owner and 2 eggs of the Cowbird

Xanthomus icterocephalis (Linn.). Yellow-headed Marsh Bird.

Chubb (1921, II, p. 564) writes that in British Guiana this species is parasitized by the local race of the Cowbird—*Molothrus bonariensis minimus.*

Lampropsar guianensis Cab. Guiana Grackle.

The brothers Penard (Die Vogels van Guyana, II, 1910, p. 372) record having found this species parasitized in Surinam by the local race of the Cowbird—*Molothrus bonariensis minimus.*

Pseudoleistes virescens (Vieill.). Yellow-breasted Marsh Bird.

This is one of the largest birds commonly victimized by the Shiny Cowbird, the species being about the size of a Meadowlark (*Sturnella magna*). Hudson and Gibson both record it as a victim of the Shiny Cowbird in the province of Buenos Aires. Gibson's observations were made at Ajó, Gral. Lavalle, in the Cape San Antonio district, while Hudson was nearer to Buenos Aires. I spent some days at Ajó and Mrs. Gibson very kindly let me look through her late husband's notebooks. It seems that he found this bird victimized on only one occasion.

Hudson (1920, pp. 124-125) writes that, "The Yellow-breast is never seen to quarrel with its fellows or with other birds, and it is possibly due to its peaceful disposition that it is more victimized by the parasitical *Molothrus* than any other bird. I have frequently found their nests full of parasitical eggs, as many as fourteen and in one case sixteen in one nest. In some seasons all the nests I found and watched were eventually abandoned by the birds on account of the number of parasitical eggs dropped in them. I have also so frequently found parasitical eggs on the ground under the nest that I believe the Yellow-breast throws out some of these foreign eggs. . . . ."

The same writer relates that in some cases it seems as though the *Pseudoleistes* may eject pure white, unspotted eggs of the Cowbird, but retain and incubate mottled ones.

Grant (1911, p. 107) says of the Yellow-breast—"that five or six eggs seem to be the full clutch though owing to the Cowbirds, *M. bonariensis* and *M. brevirostris,* this number is not often found."

In Entre Rios the Yellow-breast is frequently imposed upon and larger numbers of Cowbirds' eggs are found in its nests than in those of any other species.

Goodall (Bull. Brit. Orn. Cl., 1923, xlii, p. 68) records three victimized nests of this bird.

Trupialis militaris militaris (Linn.). Patagonian Marsh Starling.

Gibson found this species to be parasitized by *Molothrus bonariensis* in the Cape San Antonio region, Buenos Aires, and Reed has noted the same in Mendoza.

Trupialis defilippi (Bp.). "Pecho colorado."

Withington (Ibis, 1888, p. 464) writes that he has found the Shiny Cowbird to impose upon this species at Lomas de Zamora, province of Buenos Aires. He found the parasitic eggs in two nests of the *Trupialis.*

Gymnomystax mexicanus (Linn.). Giant Oriole.

Cherrie (1916 pp. 210-211) records a nest of this species at Caicara, Venezuela, on May 8, 1907 with 2 eggs of the Oriole and one of the Venezuelan race of the Cowbird—*Molothrus bonariensis venezuelensis.* This is the only case on record as far as I know.

Icterus xanthornus (Gm.). Yellow Oriole.

This Oriole is recorded by the brothers Penard (1910, p. 378) in Surinam as a victim of the local race of the Cowbird—*Molothrus bonariensis minimus.*

Dives warszewiczi. (Cab). Warszewicz's Grackle.

This icterid is victimized in Peru by the Cowbird, *M. bonariensis occidentalis* according to Taczanowski (1884 pp. 422-424)

THE YOUNG

Review of the Literature

Hudson is the only writer who has recorded much about the habits of the young of the Shiny Cowbird. Other writers have contributed merely fragmentary remarks to the literature of this subject.

Gibson (1880 pp. 14-16) notes that he has often seen young Cowbirds being fed by Chingolo Song Sparrows. He writes that the young Cowbird ". . . . follows its foster-mother for some time after leaving the nest, and with open gape, may be seen perpetually clamouring for food, which the unfortunate little Sparrow must find hard to supply in sufficient quantity."

Hudson (1920 pp. 82-86) gives an extended account of the behavior of the young Cowbird. Among other points he brings out the fact that the young parasite never understands the language of its foster-parents as do the rightful young of each of those species. It is without a sense of fear and begs for food from every bird, or even man, that comes near it. Thus, comparing it with the young of other species, he writes;—"The young of *Synallaxis spixi,* though in a deep domed nest, will throw itself to the ground, attempting thus to make its escape. The young *Mimus patagonicus* sits close and motionless, with closed eyes, mimicking death. The young of our common *Zenaida,* even before it is fledged, will swell itself up and strike angrily at the intruder with beak and wings; and by making so brave a show of its inefficient weapons it probably often saves itself from destruction. But anything approaching the young Molothrus is welcomed with fluttering wings and clamorous cries, as if all creatures were expected to minister to its necessities.

"I found a young Molothrus in the nest of a Screaming Finch, *Sporophila caerulescens;* he cried for food on seeing my hand approach the nest; I took him out and dropped him down; when finding himself on the ground, he immediately made off, half flying. After a hard chase I succeeded in recapturing him, and began to twirl him about, making him scream, so as to inform his foster-parents of his situation, for they were not by at the moment. I then put him back in . . . . the . . . . nest, and plucked half a dozen large measure-worms from an adjacent twig. The caterpillars were handed to the bird . . . . and with great greediness he devoured them all, notwithstanding the ill-treatment he had just received, and utterly disregarding the wild excited cries of his foster-parents, just arrived and hovering within three or four feet of the nest."

He also notes that the young Cowbird tries to quit the nest as soon as possible and place itself in the most conspicuous place it can find and there await the return of its food-laden foster-parent. This habit has made it an easy prey to hawks, especially the Chimango.

The Young in the Nest

The habits of the young Cowbird before and after leaving the nest are best treated separately.

Hatching and Physical Development. Near Concepción, Tucumán, I once found a nest of the Bellicose Tyrant, *Tyrannus melancholicus melancholicus,* with a Cowbird's egg in it as well as one of the owner. On visiting the nest a few days later I noticed that the Cowbird's egg was pipped and in a few minutes the shell cracked along the middle, exhibiting a young bird. At first the bird seemed absolutely devoid of down anywhere, but after the amniotic moisture had dried off I could see that there were some grayish neossoptiles on the head. The skin was light orange pink; the tarsi and toes light orange; the claws light yellow; the bill light grayish yellow; the eye skin bluish with a greenish yellow slit; the corners of the mouth were swollen and white with a dark red hind edge; the skin on the abdomen was very thin, and transparent, showing

PLATE XIII.

YOUNG OF MOLOTHRUS BONARIENSIS.

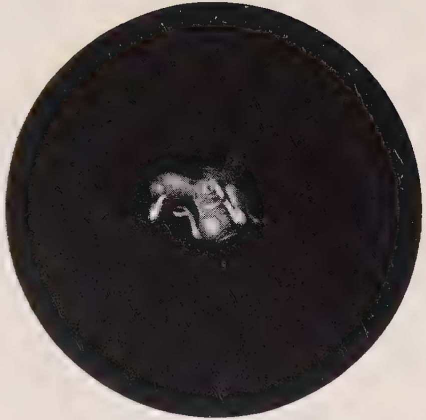


Fig. 1. Just hatched.

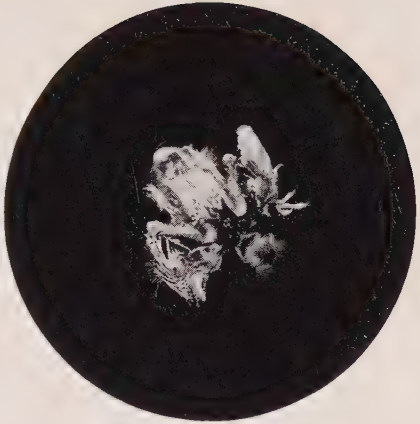


Fig. 2. Four days old.

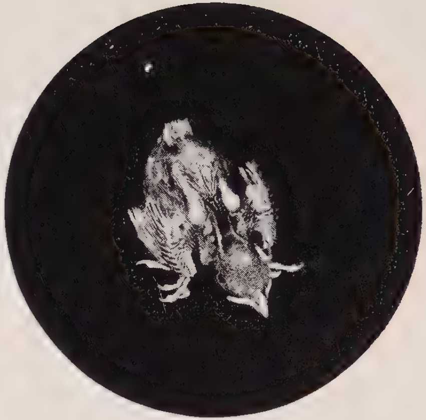


Fig. 3. Six days old.

the viscera plainly; the neossoptiles were grayish white varying in length from 8 to 11 mm., shortest on the uropygial and posterior part of the occipital pterylæ. No down indicated the future sites of the crural, abdominal, neck, and interscapular tracts, but the dorsal, (spinal) tract was scantily covered with dirty gray neossoptiles. The alar tract was indicated on the carpus but not beyond. The best developed neossoptiles were on the femoral, dorsal, and supraorbital pterylæ. The uropygial and posterior occipital tracts were small. The interior of the mouth was orange-yellow, with the middle of the roof, from the bill to the glottis, red. The edges of the gape and the entire tongue were red but the latter was posteriorly tipped with orange-yellow. A few days later all the orange-yellow portions became red. The bird weighed 2.5 grams.

During the first day the young Cowbird usually doubles in weight. The individual described above weighed 5 grams when it was 25 hours and 31 minutes old. At the end of the first day there is yet no interscapular down. By the end of the second day, the neossoptiles have grown considerably where they were present from the time of hatching, the abdominal and neck pterylæ are beginning to show through the skin, a few neosoptiles have sprouted at the lower end of the shanks, indicating for the first time the crural tracts; there is prominent down on the places from which will sprout the secondaries, tertials, and their coverts, and the sheaths of the three outermost primaries are beginning to break through the skin. At the end of the second day the weight of the young Shiny Cowbird is around 10 grams.

The sheaths of all the primaries, secondaries, and tertials have sprouted by the end of the third day; the interscapulars, while not yet sprouted, are visible through the skin; and the crural tract is considerably larger than on the preceding day. The eye is much smaller but is not yet opened. The bird gains in weight and size on the third day and at the end of the day weighs 15 grams. The egg tooth is still prominent and the same in size and shape as at birth.

On the fourth day the eyes usually begin to open. The opening is rather slow, and it is sometimes not until the fifth day that they are fully open, although they usually are so by the end of the fourth. Contour feathers have sprouted in all but the head, abdominal, crural, and uropygial pterylæ, but the down is still persistent. The underwing-coverts have sprouted (contour feathers), and the interscapulars have come through the skin and are continuous with the crural and uropygial tracts, and a few contour feathers have sprouted on the femoral tracts.

On the fifth day there is again a great increase in size and weight.

Contour feather sheaths appear on the abdominal and crural pterylæ and become more numerous and larger on the femoral tracts. The sheaths of the rectrices begin to show; the egg tooth is still present, and the tarsal envelope is sufficiently hard to show the scutellate acrotarsium.

On the sixth day the sheaths of the wing feathers begin to open, and those of the other tracts are considerably larger than on the previous day. The egg tooth is no longer very distinct in shape.

On the seventh day the sheaths of the other tracts, with the exception of those on the forehead, begin to open and all are again larger than on the sixth day.

On the eighth day all of the sheaths except those of the forehead are partly opened. Those on the forehead may begin to open on this day, but they are usually only slightly opened at the time when the bird leaves the nest.

By the ninth day the feathers have grown considerably but bare spaces are still visible between the feather tracts, especially on the venter. If frightened, the birds may leave the nest on this day, and often do so without such stimulus. They can fly a little, but are still easily caught.

By the tenth day they usually leave the nest although bare spaces still show through between the feathers of the abdomen and some down still quivers at the distal ends of some of the head feathers. The flight feathers are not entirely free from their sheaths on this day but nevertheless the young leave the nest. The space around the eyes and also the chin are still bare and the tail very small and short. The underparts have the streaks of the juvenal plumage quite imperfectly developed and not nearly as prominent as they later become as these feathers grow.

Rate of Daily Growth. The rate of daily growth varies with the individual and possibly with the species of foster-parent, but on this last point I have not sufficient data to express an opinion. Again, in some cases there may be two young birds in a nest, in which case it is conceivable that the rate of growth of either one might be a little slower than if it were the sole object of its fosterer's care.

For the first two days, the daily increase is close to 100 per cent after which it becomes less rapid, being about 50 per cent on the third day, and gradually lessening until it comes down to 10 per cent on the eighth day and about 6 per cent on the ninth. When the Cowbird leaves the nest it weighs about 35 grams or about 13 times as much as it did when hatched.

The growth of the young Cowbird is almost entirely a matter of food, which brings us to a consideration of this item.

Food of the Young Cowbird. The food given to young Cowbirds by the foster-parents is exactly the same as that given to their rightful young. Of the eighty species of birds known to be victimized by the Argentine race of the Cowbird, one-sixth are definitely known to raise young Cowbirds, and all the others probably do, but actual records are lacking. This means that the young Cowbird samples the diet of a great many species, although the diets of most of them are practically the same. If we remember that the Cowbird's breeding area covers most of South America, the number of species of insects eaten by all its individuals must be tremendous.

My notes on the food given to young Cowbirds are all observational, and, consequently not exact or specific in their analyses. I have seen Chingolos (*Brachyspiza capensis*) feed young Cowbirds cutworms, coleopteran larvæ, (white grubs), caterpillars of various small kinds, and small unidentified insects. In Tucumán I watched a Red-bellied Thrush (*Turdus rufiventris*) feed a young *Molothrus* several cutworms and other insect food.

Behavior and Development of Instincts. For convenience in discussion we may divide the nest life of the young Cowbird into three stages. These stages are fairly distinct but no hard and fast lines can be drawn between them. 1. Period of Infancy—from birth to the age of four days. 2. Period of Sense Perception—beginning with the opening of the eyes, usually attained on the fourth day. 3. The Flight Stage—when the young, fully fledged, leave the nest; usually attained on the tenth day, but sometimes postponed until as late as the twelfth day.

1. *The Period of Infancy.* When first hatched young Cowbirds are blind and helpless and seem entirely unfit for the coming struggle for existence with the rightful occupants of the nest. The first feeding, however, seems to give them a start, and from then onward their strength increases rapidly and their growth, as is that of most birds, is little short of phenomenal.

At birth the young Cowbird exhibits powers of orientation, food reactions, and initial call-notes.

If a young Cowbird is turned over on its back, it struggles to right itself. I tried this with several individuals of various ages and in all cases the nestlings succeeded in righting themselves.

The food reaction consists of stretching the neck to elevate the head as high as possible, opening wide the mouth and calling for food, meanwhile quivering slightly all over. This type of reaction is common to practically all nestling passerine birds but with all non-parasitic species this type of behavior becomes modified by association after the bird is a few days old. Most birds soon learn to distinguish between their returning food-bearing parents and any strangers. Also, after they are a few days old they will not give the food reaction if taken out of the nest. This does not hold for the Shiny Cowbird. The young parasite never learns to distinguish between friend and foe and begs for food from both alike. As an extreme example the case recorded by Hudson, and quoted a few pages back may be recalled. While I never subjected a young *bonariensis* to as severe treatment as he did, nevertheless I was none too gentle in handling several individuals, all of which begged for food as soon as I stopped handling them.

The initial call note is a soft *peep* which seems to be given more frequently in this species than in its North American congener. When the bird is a few days old this note loses its pristine softness, and acquires a beady, strident quality which by the seventh day completely dominates it and the original *peep* becomes a strident, sibilant *zeee,* similar to but harsher than the corresponding note of *M. ater.*

2. *The Period of Sense Perception.* With the opening of the eyes on the fourth day the actions of the young Cowbird undergo considerable change. It now takes an interest in its surroundings, assumes attitudes not tried before, and indulges in nest exercises of several types. The first change to be noticed is in the posture of the bird. During the period of infancy it lies on its belly with the head resting on the floor of the nest—a flat position, all in all. Shortly after the opening of the eyes, it begins to assume a sitting position, keeping the head up off the floor of the nest, and when the head is brought down to the nest it is usually on, or hanging over, the rim. The young Cowbird begins to take notice of things external to the nest such as passing insects, leaves waving in the wind and particles falling from nearby branches. Things in the nest that hitherto went unnoticed are now observed—straws and nest-inhabiting insects are snapped at.

As in *M. ater,* the young Cowbird differs from the young of most other altricial birds in that it never develops any calls which may properly be termed "alarm calls," nor does it respond to, or understand, the alarm calls and danger signals of its foster-parents. Usually the instincts of adult and young fit like key and lock, but no such harmony exists between the nestling Cowbird and its nurse. The young parasite not only does not obey the signals of its foster-parents but seems not to notice even the feeling of anxiety in their alarm calls that are expressive to so un-avian an ear as the human one. Many times I have visited a parasitized nest and the nestling Cowbird pleaded noisily for me to feed it although the

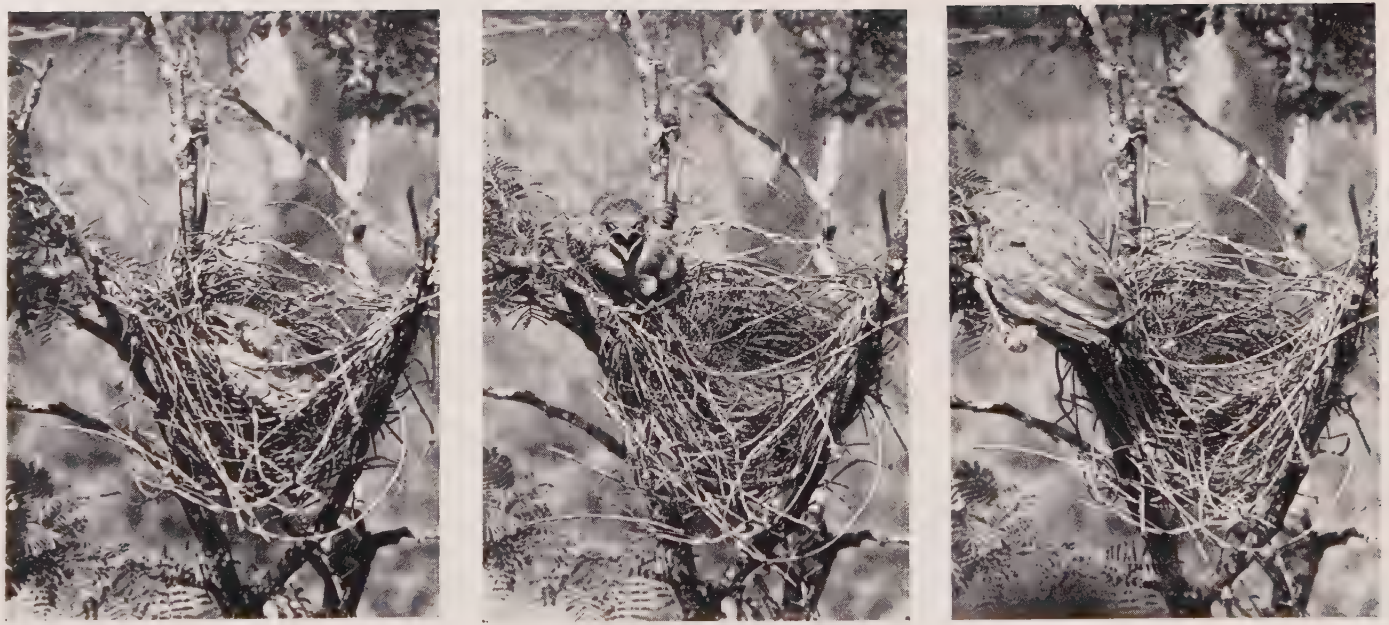


PLATE XIV.

Ten-Day-Old Molothrus bonariensis Leaving Nest of Tyrannus melancholicus.

Chingolos nearby were voicing their general excitement and particular distrust.

The nest exercises are of three main types:

1. Preening—this habit first appears when the birds are about a week old. The nestlings spend considerable time preening their feathers from this time on until they are fully fledged, and the habit probably assists the contour feathers to break out of their sheaths.
2. Stretching to reach various objects in or near the nest. This exercise seems to be very trying to the birds as it never is indulged in for more than a minute at a time after which the birds drop back as though exhausted.
3. Flapping the wings and crawling about the nest on "all fours."

The reactions of the nestling Cowbird to other nestlings or to eggs in the same nest are of interest.

On November 4, 1923, at Concepción, Tucumán, I found a nest of a Chingolo Song Sparrow (*Brachyspiza capensis*) containing three Cowbird's eggs and one egg of the owner. The next day one of the Cowbirds hatched during the morning. On November 6, the Chingolo's egg was gone. On November 7 another Cowbird hatched. The next day the third parasitic egg was missing. Both young Cowbirds seemed to be doing well but on November 10 the younger one was very weak and next day I found it dead in the nest. The other Cowbird grew rapidly and left the nest on November 15.

A nest of the Bellicose Tyrant (*Tyrannus melancholicus*) contained one egg of the owner and one of the Cowbird on November 23, 1924. On November 28, the Cowbird egg hatched and the next day the young Flycatcher emerged from its egg. Two days later the latter was found dead in the bottom of the nest.

These are just two cases picked more or less at random out of a large number of similar instances and serve to show that usually when a nest is parasitized only the young Cowbird survives. When two young Cowbirds are hatched in the same nest, usually only the older one survives.

The young Cowbird usually tramples on the other young in the nest and in this way deliberately overcomes their competition for the food supplied by the old birds. Also the former are usually larger and can hold their heads higher and open their mouths wider when the foster-parent returns with food. Inasmuch as hunger is expressed by this food reaction and also inasmuch as most birds do not feed their young in sequence but usually feed the one that seems hungriest, the Cowbird

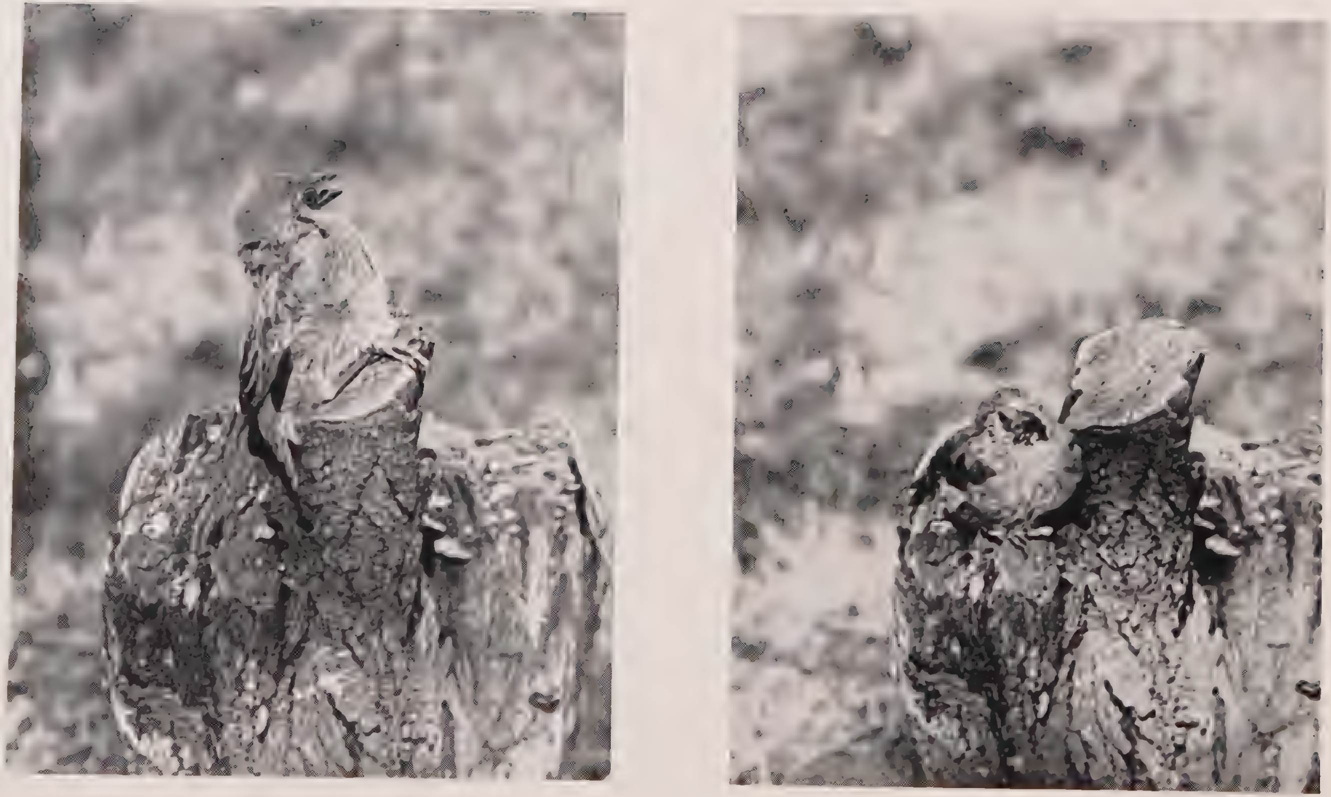


PLATE XV.

Young Molothrus bonariensis About a Week Out of the Nest.

has a great advantage over its nest-mates. Aside from this, the fact that the young Cowbirds usually hatch first gives them a further advantage.

In some cases the rightful young do survive along with the young parasite. I have known of young Rufous Ovenbirds being reared in the same nest as a young Cowbird. Here, however, some unusual factors play a part. In the first place the Ovenbirds are larger than the Cowbirds and the eggs of the two species bear the same size ratio to each other as do the adults. Secondly, the nest is domed and roomy so that the parasite cannot easily crowd out and trample on the young Ovenbirds or shove them out. The rightful eggs cannot be pushed out of the nest and for this reason have a fair chance of hatching even if the Cowbird's egg hatches first.

In some cases the adult Cowbirds help to do away with the nest-mates of the young by removing or destroying an egg when laying into the nest.

Development of the Food Call. As stated before, the initial call note, a faint *peep* assumes, towards the end of the period of infancy, a sibilant, strident quality which entirely replaces its pristine softness in a few days. The note becomes a beady, sibilant *zeee* and reaches its full development when the bird is about a week old. For a small passerine bird its food call is very loud and insistent, almost exactly like the corresponding note of *M. ater*. Towards the eighth or ninth day the note becomes even more beady, slightly more husky, and a little lower in pitch.

The Flight Stage. This stage of development is very short and is characterized by the first intimations of the instinct of fear and by an extension of the general nest exercises of the young bird. Instead of being content with remaining in the nest the young Cowbird now begins to climb about and perch on the rim or even on part of the supporting twigs. Its food response is augmented by a rapid quivering of the wings, the motion apparently being confined to the manus and carpus, the humerus not being involved. Occasionally it even takes a step towards its returning, food-laden foster-parent, as though trying to meet it and be fed that much sooner. It frequently stretches its wings at this stage.

Fear is first observed at about the ninth or tenth day although even then it is hardly developed. A sudden noise or jar may make the bird quit the nest but it will still permit of very close approach and clamor for food from the very source which may have caused it to leave the nest. The warnings and danger-calls of its foster-parents are not heeded, and with quivering wings, slightly trembling body, and loud calls it appeals for food from every passing bird and even from humans.

The first flights are short and clumsy but after the bird has been out of the nest two or three days it is no longer easy to catch, although still quite fearless and unsuspicious. It usually remains in the immediate vicinity of the nest for a few days and in the surrounding general territory for about a week.

The Young Out of the Nest

The young Cowbird usually remains in the territory of its foster-parents for about a week after leaving the nest, and sometimes longer. It continues to be fed by its fosterers for at least two weeks and probably longer.

I found young Cowbirds were extremely scarce in Tucumán and attribute this scarcity to the abundance of hawks which probably prey on them and to the stupid fearlessness of the young parasites which makes them easy victims. Hudson noted that the young Cowbirds, on leaving the nests in which they had been reared, were much inclined to place themselves in very conspicuous perches and loudly plead for food from every passing creature. He noted that young Cowbirds were relatively scarce during the season when the Chimango (*Milvago chimango*), a large hawk, has young in the nest.

I have seen young Cowbirds, about two weeks out of the nest, being fed by Gray Saltators (*Saltator cœrulescens*), by an Orange-billed Saltator (*Saltator aurantiirostris*) and by a Red-bellied Thrush (*Turdus rufiventris*), in all of which cases the young parasite could fly well and usually came half way to meet its fosterers each time. At the same time, they begged for food from other birds but never were successful in their pleadings. Hudson has recorded seeing a *Hapalocercus flaviventris* perch on the back of a young Cowbird to feed it. Of course the youngster was much larger than its fosterer in this case.

The food call of the young bird at this stage of its career is lower in pitch than its nest food-call and is identical with that of *M. ater.*

PLUMAGES AND MOLTS

The plumages and molts of *Molothrus bonariensis* present no unusual peculiarities. The various plumages and molts will be given first for the typical form of this species and then the different plumages will be treated for each of the races. The molts are the same in all, so they need not be repeated.

Molothrus bonariensis bonariensis

Male

1. Natal Down: mouse-gray.

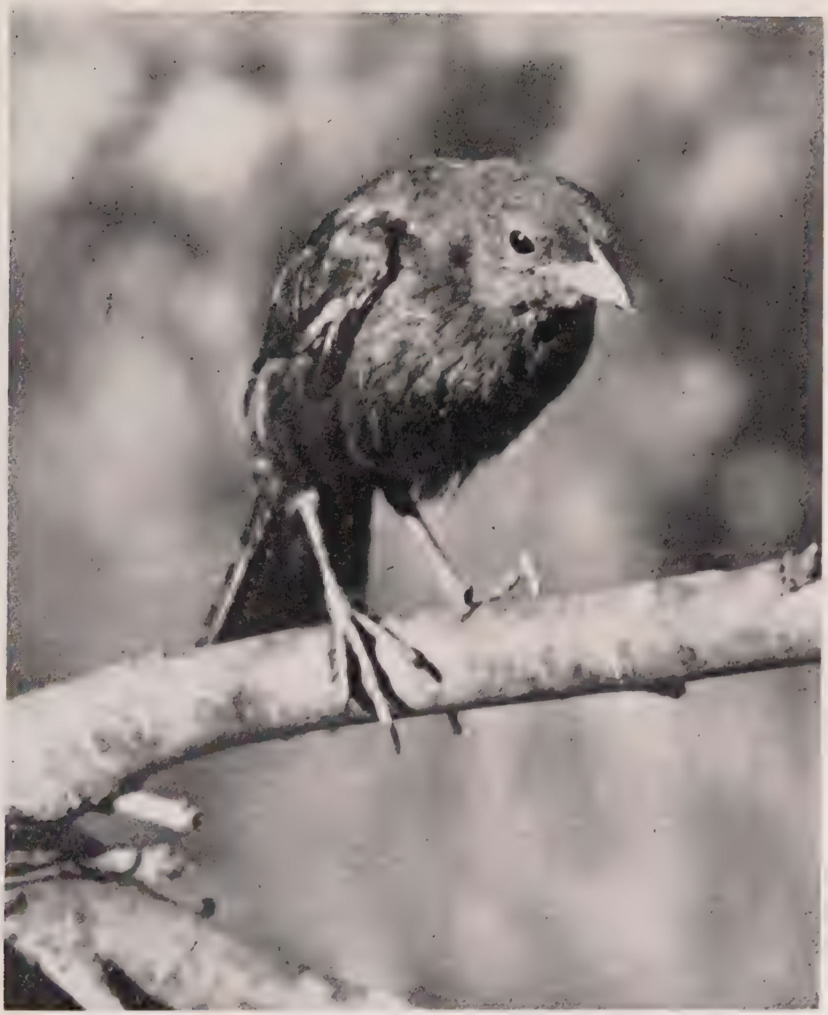


PLATE XVI.

Young Molothrus bonariensis About Three Weeks Out of Nest.
(Captive bird)

2. Juvenal Plumage acquired by a complete postnatal molt.

Above varying from dark chaetura drab to fuscous black, the feathers in newly fledged birds margined with dusky grayish-brown, these margins soon wearing off; the wing coverts more broadly margined and the margins lighter; underparts dull buffy-gray, heavily streaked, the streaks varying from sooty grayish-brown to fuscous black, the streaks in older birds broader than in younger ones and at times almost entirely concealing the buffy-gray, giving the bird a very black appearance; the buffy-gray usually more noticeable on the chin than elsewhere; bill, legs, and feet dark brown.

3. First Winter Plumage acquired by a complete post-juvenal molt. The young birds become very similar to adults but usually retain some of the brown wing or tail feathers and sometimes some of the juvenal body feathers as well. In this species I found that about 80 per cent of the birds retain at least one or two juvenal wing or tail feathers while in *Molothrus ater* very few birds retain any of the juvenal feathers in the first winter plumage.

Above and below lustrous black with irridescent purplish and bluish reflections; wing and tail with greenish reflections.

4. First Nuptial Plumage acquired by wear, which shows very little but chiefly in a slight increase of bluish over purplish in the reflections.

Head, neck, back, scapulars, throat, breast, and upper part of abdomen silky violet-black; flanks, lower part of abdomen, rump, upper and under tail-coverts glossy blue-black; wings, (except middle and lesser coverts), glossy greenish-black; middle and lesser coverts glossy blue-black tinged with violet; bill, legs and feet black.

5. Adult Winter Plumage acquired by a complete postnuptial molt. Adults are not distinguishable from young birds in first winter plumage except that they have no brown feathers.

6. Adult Nuptial Plumage acquired by wear as in the young bird.

Measurements (skins): wing 105-118.5 mm. (114.5 mm.); tail 73-91 mm. (82.6 mm.); culmen, from base 18-21 mm. (19.5 mm.).

Female

1. Natal Down: same as male—mouse-gray.

2. Juvenal Plumage acquired by a complete postnatal molt.

Very different from male. (This is the only species of the genus in which the juvenal plumages of the two sexes are usually different). Above varying from light tawny olive to buffy brown, the feathers margined with grayish tawny, the margins most pronounced on the wing-coverts, secondaries and outer rectrices; the scapulars and interscapulars with dusky mesial streaks; underparts varying from dull light buffy to light grayish, slightly washed with buffy, and distinctly but not always conspicuously streaked with light grayish brown, the streaks in some specimens being confined to the shafts of the feathers; bill, legs and feet brown, the feet in the specimen examined darker than in any juvenal males seen.

3. First Winter Plumage acquired by a complete post-juvenal molt. In this plumage young birds become indistinguishable from adults.

Head, neck, back, scapulars, and interscapulars grayish olive-brown; rump and upper tail-coverts grayer and less olive than back; wings and tail dusky brown with grayish-brown edgings; underparts hair-brown, darker on the sides and lighter on the chin and throat which are light hair-brown; bill, legs and feet black.

4. First Nuptial Plumage acquired by wear which shows very little. Similar to preceding plumage, and all subsequent plumages are like this one.

5. Adult Winter Plumage acquired by a complete postnuptial molt. Indistinguishable from young birds in first winter plumage.

6. Adult Nuptial Plumage acquired by wear as in young bird.

Measurements, adults and young alike (skins): wing 97-104 mm. (99.7 mm.); tail 69-75 mm. (71.5 mm.); culmen, from base 17-18 mm. (17.6 mm.).

Molothrus bonariensis aequatorialis

Male

1. Natal Down: not seen.
2. Juvenal Plumage.

Above dark brown, the feathers faintly edged with buffy brown, the edgings most pronounced and lightest on the lesser and middle wing-coverts; underparts buffy-yellowish heavily streaked with dark brown, the buffy being most yellowish on the chin and throat and least so in the middle of the abdomen; feathers of the thighs slightly tinged with rufous brown; bill, legs and feet blackish brown.

All other plumages similar to corresponding plumages of *M. b. bonariensis* but birds are larger.

Measurements (skins): wing 114-123 mm. (119.9 mm.); tail 88-97.5 mm. (96.6 mm.); culmen, from base, 20-22 mm. (21.2 mm.).

Female

1. Natal Down: not seen.
2. Juvenal Plumage.

Similar to male but much yellower and less heavily streaked below, and has a buffy yellow superciliary stripe.

Other plumages similar to corresponding plumages of *M. b. bonariensis* but darker, especially below; underparts dark olive brown, the feathers of the neck, scapulars, and interscapulars with dark mesial streaks; wings and tail dark brown; underparts nearly as dark as the back, dark olive brown, the feathers of the breast and upper part of the abdomen often with dark terminal shaft streaks.

Measurements (skins): wing 99.5-105 mm. (102.7 mm.); tail 76.5-82 mm. (78.8 mm.); culmen, from base 17-20 mm. (18.7 mm.).

Molothrus bonariensis occidentalis

Male

1. Natal Down: not seen.
2. Juvenal Plumage: not seen.

All subsequent plumages like those of *M. b. bonariensis* but more richly glossed with purple; indistinguishable from adult males of subsp. *venezuelensis*.

Measurements (skins): wing 108.5-113 mm. (109.6 mm.); tail 81-86 mm. (83.5 mm.); culmen, from base 20-21 mm. (20.5 mm.).

Female

1. Natal Down: not seen.
2. Juvenal Plumage: not seen.

Subsequent plumages similar to those of *M. b. bonariensis* but lighter below and less uniform in color above; the feathers of the head, scapulars and interscapulars with dusky mesial streaks and edged with buffy brown; below, throat lighter than in *bonariensis,* breast and flanks as in *bonariensis;* abdomen light grayish-white streaked with light buffy brown.

Measurements (skins): wing 94-98 mm. (96 mm.); tail 72-75 mm. (73.5 mm.); culmen, from base, 18-19 mm. (18.5 mm.).

Molothrus bonariensis venezuelensis

Male

1. Natal Down: not seen.
2. Juvenal Plumage similar to that of *bonariensis.*
3. Subsequent plumages similar to those of *bonariensis* but more richly glossed with purple; indistinguishable from adult males of subsp. *occidentalis.*

Measurements (skins): wing 111-113 mm. (112 mm.); tail 81-88 mm. (85.3 mm.); culmen, from base, 20 mm.

Female

1. Natal Down: not seen.
2. Juvenal Ulumage: not seen.

Subsequent plumages similar to those of *bonariensis* but darker above, more like corresponding plumages of *M. b. minimus* in this respect; the scapulars and interscapulars with dusky mesial streaks; lighter and more yellowish below, the feathers of the breast and abdomen with dusky mesial streaks.

Measurements (skins): wing 102-104 mm. (103 mm.); tail 80-81 mm. (80.5 mm); culmen, from base, 17.5-19 mm. (18.3 mm.).

Molothrus bonariensis minimus

In this race the juvenal plumages of the two sexes are practically identical, that of the male averaging slightly darker than that of the female, while in all other races of the species the two are quite different. In this lack of sexual dimorphism in the juvenal plumage this bird resembles the North American *M. ater,* and this feature, together with its very distinct size characters, indicates that *minimus* is very near to specific distinction.

Male

1. Natal Down: not seen.
2. Juvenal Plumage similar to the juvenal plumage of the *female* of the typical *bonariensis* but very slightly darker, especially on the upperparts and much smaller.
3. Subsequent plumages like those of *bonariensis* but much smaller (the smallest of all the races).

Measurements (skins): wing 94-100 mm. (96.9 mm.); tail 72-78.5 mm. (75.2 mm.); culmen, from base, 18 mm.

Female

1. Natal Down: not seen.
2. Juvenal Plumage like that of *bonariensis* but much smaller.
3. Subsequent plumages similar to those of *bonariensis* but the forehead and crown darker (dark grayish brown); the scapulars and interscapulars with distinct dusky mesial streaks.

Measurements (skins): wing 84-89.5 mm. (86.7 mm.); tail 63.5-69 mm. (66.2 mm.); culmen, from base, 16-17 mm. (16.5 mm.).

Molothrus bonariensis cabanisii

Male

1. Natal Down: not seen.
2. Juvenal Plumage like that of *bonariensis* but larger.
3. Subsequent plumages similar to those of *bonariensis* but the bird can always be told by its large size (largest of all the races).

Measurements (skins): wing 122.5-133 mm. (129.1 mm.); tail 96.5-108 mm. (102.4 mm.); culmen, from base 20.5-22.5 mm. (21 mm.).

Female

1. Natal Down: not seen.
2. Juvenal Plumage.

Above buffy brown, the feathers margined with buffy olive; brown scapulars and interscapulars with dusky mesial streaks; underparts dull light buffy streaked with grayish brown, the chin and throat only very slightly streaked; bill, legs and feet tawny brown, lighter than in the young of any other race examined.

Subsequent plumages similar to those of *bonariensis,* but slightly paler, but may always be identified by large size.

Measurements (skins): wing 105-114.5 mm. (110 mm.); tail 80.5-90 mm. (88.1 mm.); culmen, from base, 18-19.5 mm. (18.7 mm.).

Molothrus bonariensis milleri

Male

1. Natal Down: not seen.
2. Juvenal Plumage: very dark. Above: head, nape, scapulars, interscapulars, back, rump, and upper tail-coverts dark brownish black, wing coverts and remiges, and also the rectrices fuscous brown; below: entire underparts similar to back but paler and more brownish on the center of the throat, abdomen, flanks, thighs, and under tail-coverts; bill (dried) dusky yellow-brown, darker on culmen and tips; feet dark brown; soles of toes yellow.
3. Subsequent plumages similar to those of *aequatorialis* but bluer, less violaceous, and smaller.

Measurements: wing 103-107 mm. (105 mm.); tail 71-72 mm. (71.5 mm.); culmen, from base 17.5-19 mm. (18.2 mm.).

Female

1. Natal Down: not seen.
2. Juvenal Plumage: Entire bird fuscous, the outer primaries narrowly edged with very light grayish, throat slightly lighter than rest of underparts; bill (dried) yellowish brown, dusky towards the tip and at the base of the culmen; feet yellowish brown.
3. Subsequent plumages similar to *aequatorialis* but less olivaceous below and smaller.

Measurements: wing 93-95 mm. (93.2 mm.); tail 61-64 mm. (63 mm.); culmen, from base 15.5-16.5 mm. (15.8 mm.).

Molothrus bonariensis melanogyna

Male.

1. Natal Down: not seen.
2. Juvenal Plumage: not seen.*
3. Subsequent plumages similar to those of typical *bonariensis.*

Measurements: wing 114.0; tail 80.0; culmen, from base 18.0 mm.

Female

1. Natal Down: not seen.
2. Juvenal Plumage: not seen.
3. Subsequent plumages. Above: solid blackish with a slight bluish sheen to the feathers; below: dark blackish, but slightly lighter than the back, less uniform and blacker in old birds than in younger individuals.

Measurements: wing 99-101 (100); tail 69-70.5 (69.8); culmen, from base 17 mm.

FOOD

The Shiny Cowbird is very similar to its North American congener in its food habits. Its food consists of both animal and vegetable matter but the former predominates during the entire year. Reed (1913) investigated the food of this Cowbird in Mendoza and his report was translated by Leo Miller (1917 p. 582-583) as follows.

"In the summer of 1910 there occured in various departments of the Province of Mendoza, a great invasion of *Isocas* (larvæ of a lepidopteran) and in various inspections which I realized in the infected countryside, I was able to confirm that a number of birds occupied themselves in eating the larvæ and adults of these *Isocas* (*Colias lesbia* Fabr.), and among them *Molothrus bonariensis* predominated.

"It is also a voracious destroyer of the white worm (larva of *Ligyrus bidentulus* Fairm.) when these are exposed in plowing furrows in the vineyards. The 'bicheo de cesto' (*Æcetius platensis* Berg) is also very much persecuted by the bird with which we are occupied.

"The corn fields suffer damages by reason of *Molothrus bonariensis,* but only during the period between the ripening of the ear and its collection; certainly one ought not to take this damage into consideration, when during eleven months *Molothrus bonariensis* has fed in the cultivated country, on other products, not on maize, and among these has predominated the larva of *Chloridea armigera* (Hub.) the most formidable enemy of the maize fields.

"I have examined the stomach contents of more than sixty specimens of *Molothrus bonariensis,* freshly shot, and always, in the various seasons, I have encountered about 90 per cent of the substances of animal origin and the rest of grains, principally maize, but the maize they have generally obtained from the offal of

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*It may be that *Molothrus murinus* Pelzeln, described from Rio de Janeiro, is the juvenal plumage of this race. It is said to resemble the young of *Tangavius armenti* Cabanis. (See under this species for description of plumage.) If this is proved correct then the name *murinus* will have to be used for this race and *melanogyna* be relegated to synonymy.

horses and mules, as in Mendoza a good deal of maize is given to working animals and as the grain is fed entire, a good per cent is eliminated without having been digested. It is for this reason that one frequently finds *Molothrus bonariensis* scratching among and turning over the droppings. This custom is the reason for its having been given the common name of 'Vira-Bosta' in Brazil. For this reason *Molothrus bonariensis* may be looked upon as a bird helpful rather than destructive to agriculture."

During the course of field work I examined the contents of the stomachs of about seventy-five Cowbirds and found animal matter to predominate over vegetable food. In fact most of the birds that had any corn in their gizzards were shot in or near a stable yard where considerable quantities of corn were fed to the horses and strewn over the ground where it fell from the feeding trough. However in the later part of the summer when the the crops are ripening, the Cowbirds, which are then through breeding and are in large flocks, do considerable damage. In Tucumán the rice fields suffer heavily from the depredations. Mr. Paul Haimes, an American rice grower in Tucumán, told me that these flocks are enormous at times and that he had killed as many as seventy-five or eighty birds with a single discharge of both barrels of his shot gun. The case is very similar to that of the Bobolink (*Dolichinyx oryzivorus*) in the rice fields in the southern States. Throughout the rest of the year the Cowbirds are entirely beneficial in their food habits. In quite a number of gizzards I found quantities of small white "grubs" and at times small caterpillars, weed seeds, and once, a part of a locust. During the spring migration in Tucumán I found that migrating birds fed more on seeds than did resident individuals, but the difference between the diets of the two groups was not as distinct as in the case of *M. ater* of North America.

ENEMIES

The Shiny Cowbird undoubtedly has as many enemies as most birds, but very little is known about them. No published accounts tell of any definite instances of hawks, owls, rodents, etc., preying on the adults of this species, but the young are often eaten by some of the birds of prey. The Cowbirds, after leaving the nests of their foster-parents, usually place themselves in conspicuous places and call for food from every passing bird. Hudson (1920, pp. 85-86) writes that, ". . . . this habit is most fatal on the open and closely cropped pampas inhabited by the Pipit (*Anthus correndera*). In December, when the Cachila Pipit rears its second brood, the common and abundant Carrion Hawk also has young, and feeds them almost exclusively on the young of various species of small birds. At this season the Chimango destroys great numbers of the young of the Pipit. . . . . It thus happens that in districts where the *Molothrus* is abundant, their eggs are found in a majority of the Pipits' nests; and yet to find a young Cow-bird out of the nest is a rare thing here, for as soon as the young birds are able to quit the nest and expose themselves they are mostly carried off by the Hawk."

I never actually saw a Hawk of any species carry off a young Cowbird but my experience was very similar to that of Hudson's. All through the breeding season (October—January) I found large numbers of nests with eggs or young of this Cowbird but in all my six months in the field I saw only five young Cowbirds of this species out of the nest. Hawks must occasionally harrass the Cowbirds because they are apparently considered enemies by the latter. In Tucumán I once saw a flock of Cowbirds pursuing a white hawk in the same way that Kingbirds do in North America. I shot the hawk which proved to be a female White Kite (*Elanus leucurus*). In its stomach were the remains of a mouse about the size of the common *Mus musculus* but with an apparently heavier tail; but no bird remains were found.

No intestinal parasitic worms and no mallophaga or hypoboscids have been recorded from the Shiny Cowbird.

COMMON NAMES

The Shiny Cowbird is known by a number of names to the English and Spanish speaking peoples of South America. The following list comprises all the names for this bird that I heard in actual use or have found in literature. Where a name applies to only one subspecies I have put the race in parentheses.

A. English names.
  1. Cowbird
  2. Common Cowbird
  3. Argentine Cowbird *(M. b. bonariensis)*
  4. Guiana Cowbird *(M. b. minimus)*
  5. Silky Cowbird
  6. Shining Cowbird
  7. Corn-bird *(M. b. minimus)*
  8. Blackbird
  9. Lazy-bird *(M. b. minimus)*
  10. Glossy Starling
  11. Bluey-black
  12. Brazilian Starling

B. Spanish names.
  1. Tordo
  2. Tordo comun
  3. Tordo negro
  4. Tordo azul
  5. Tordo renegrido
  6. Tordo argentino
  7. Tordo mulato (females)
  8. Renegrido
  9. Pastero
  10. Bovero
  11. Gauderio
  12. Mirlo
  13. Pajaro negro
  14. Verondica

C. Native Indian names.
  1. Murajú (also Morajú)
  2. Murajú negro
  3. Burrumichi (Bolivia)
  4. El Guyra-hú
  5. Gwihra-h (Paraguay)
  6. Kuihrahu (Paraguay)
  7. Kosoleka Akawai Indian *(M. b. minimus)*

D. Portugese (Brazilian) names
  1. Virabosta (also Vira Bosta)
  2. Papa de arroz
  3. Papa arroz
  4. Tordo
  5. Chopím
  6. Parasita
  7. Corichó

E. French names
  1. Bruant-noir

F. German names
  1. Viehstaar
  2. Kuhvogel

Synonymy

Molothrus bonariensis bonariensis

Tangavio, Daub. Pl. Enl. 710 unde

Tanagra bonariensis, Gm. S.N., i, p. 898.

Tordo comun, Azara, Apunt, i, p. 275.

Icterus sericeus Licht. Doubl. 1838, p. 19; Tsch. Faun. Peru, p. 225.

Molothrus sericeus, Bp. Consp. p. 437; Pelz. Orn. Bras. 1871, p. 200; Sclater Cat. Am. Birds, 1862, p. 135; Cassin, Proc. Ac. Nat. Sc. Phil. 1866, p. 12.

Icterus minor Spix, Av. Bras. i, p. 67, pl. 63 (?).

Icterus violaceus, Max. Beitr. III, p. 1212.

Scolecophagus sericeus, Swa. Anim. in Menag., 1837, p. 301.

Molothrus niger Gould, Zool. Voy, Beagle, iii, p. 107.

Passerina discolor, Vieill. Nouv. Dict. d'Hist. Nat xxxiv, p. 552 et Ency Meth. p. 937.

Molobrus sericeus, Burm. Syst. Ueb. iii, p. 279, et La-Plata Reise, ii, p. 494; Sternb., Journ. f. Orn. 1869, p. 125.

Molothrus bonariensis, Cabanis, Mus. Hein. i, 1851, p. 193; Cassin, Proc. Ac. Nat. Sc. Phil. 1866, p. 19; Sclater and Salvin, Proc. Zool. Soc. Lond., 1868, p. 140 (Argentine republic); Hudson, Proc. Zool. Soc. Lond., 1872, p. 809, et 1874, p. 153 et seqq. (Buenos Aires); Sclater and Slavin, Nom. Av. Neotr. 1873, p. 37; Berlepsch, Journ f. Orn. 1873, p. 249 (Santa Catharina); Durnford, Ibis 1877, pp. 33, 174 (Chupat); Forbes, Ibis 1881, p. 339 (Pernambucco); Sclater, Ibis 1884, p. 5 (monogr.); Sclater, Cat. Birds Brit. Mus. xi, 1886, p. 325; Berlepsch, Journ. f. Orn. 1887, p. 116 (Paraguay); Barrows, Bull. N.O.C., 1883, p. 133 (habits in Argentina and Uruguay); Sclater and Hudson, Arg. Orn. i, 1888, p. 72 (monogr); Riker and Chapman, Auk, 1890, p. 269 (Santarem, Brazil); Stone, Auk 1891, p. 345, (monogr.); Kerr, Ibis 1901, p. 224; Lonnberg, Ibis 1903, p. 457; Chubb, Ibis 1910, p. 644 (Paraguay); Ihering, Revista Mus. Paulista, vi, p. 323 (Paraguay); Grant, Ibis 1911, p. 103, et Ibis 1912, p. 278; Brabourne and Chubb, 1912, p. 434 (ref. orig. descr., range); Rahmer, Bol. Mus. Nac. Chile, 1912, pp. 207-209 (habits); Serie, El Hornero 1918, p. 73 (common names) Sanzin, Hornero 1918, p. 152 (Mendoza); Marelli, Hornero 1919, p. 227 (food); Hudson, Birds La Plata, 1920, i. p. 69 habits); Tremoleras, Hornero 1920, p.

24 (Uruguay); Renard, Hornero 1920, p. 60; Arribalzaga, Hornero 1920, p. 98 (Chaco); Daguerre, Hornero 1922, p. 271 (prov. Buenos Aires); Dinelli, Hornero 1922, pp. 312-313 (eggs); Pereyra, Hornero, 1923 p. 172 (Buenos Aires); Niedfield, Hornero 1923, p. 189; Serie and Smyth, Hornero 1923, p. 54 (Entre Rios); Giacomelli, Hornero 1923, p. 70 (La Rioja).

C(assicus) T. atronitens, Merrem, in Ersch and Gruber, Allgem. Encyclopadie Wissensch. and Kunste 15, 1826, p. 276 (nom. nov. for *Tanagra bonariensis* Gmelin and *Xanthornus purpurascens* Hahn.).

Molothrus bonariensis bonariensis, Dabbene, Orn. Arg. 1910, p. 402 (distr. in Argentina); Hussey, Auk, 1916, p. 399 (La Plata); Dabbene, Hornero 1919, p. 247 (Martin Garcia Isl.); Wetmore, Bull. U. S. Nat. Mus. 133, 1926, pp. 383-386 (habits, etc.); Friedman, Auk, 1927, p. 500.

Molothrus brevirostris Swains. Anim. in Menag. Dec. 31, 1837, p. 305.

Molothrus maxillaris (d'Orb. et Lafr.), Syn. Avium, ii, Mag. de zool., 1838, p. 6; Cassin, Proc. Ac. Nat. Sci. Phila., 1866, p. 12.

Icterus maxillaris d'Orb. et Lafr., Mag. de Zool., 1838, p. 6; d'Orb. Voy. Am. Mer. Ois., t. iv, part 3, p. 367 et pl. 52, fig. 3., Sclater and Salv. Proc. Zool. Soc. Lond., 1879, p. 643.

Cyrtotes maxillaris Bp., Consp., i, 1850, p. 437; Sclater, Ibis 1884, p. 9.

Molothrus bonariensis minimus

Molothrus minimus, Dalmas, Mem. Soc. Zool. France, 13, 1900, p. 138 (Tobago).

Molothrus atronitens, Cabanis, in Schomb. Reis, Brit. Guiana, iii, 1848, p. 682 (Brit. Guiana); Finsch, Proc. Zool. Soc. Lond., 1870, p. 576 (Trinidad); Pelzeln, Orn. Bras., 1871, p. 200; Berlepsch, Journ. f. Orn., 1873, p. 249 (Prov. Santa Catarina, s. Brazil); Sclater, Ibis, 1884, p. 6 (monograph); Cat. Birds Brit. Mus., xi, 1886, p. 337 (syn. part Venezuela; Trinidad; Demerara, Brit. Guiana; Oyapoc, Cayenne; Mexiana Is., lower Amazon); Stone, Auk, 1891, p. 346 (monograph); Cory, Auk, 1893, p. 220, (Tobago); Ridgway, Bull. U.S. Nat Mus. 50, part ii, 1902, p. 211 (syn. and descr. and range); Wells, Auk, 1902, p. 347 (Carriacou); Lowe, Ibis, 1909, p. 312 (Grenada), p. 323 (Cariaco Peninsula); Brabourne and Chubb, 1912, p. 435 (range); Wetmore, Auk, 1916, p. 419 (Vieques Is. P.R.); Wetmore, Auk, 1919, p. 197 (structure of palate); Wood Auk 1923, p. 128 (Barbadoes).

Molothrus atro-nitens, Goeldi, Ibis 1897, p. 164; Chapman, Bull. Am. Mus. Nat. Hist. 1894, p. 36 (Trinidad); Quelch, Anim. Life in Brit. Guiana, 1901, p. 135.

Molothrus discolor, (not *Passerina discolor,* Vieillot) Cassin, Proc. Ac. Nat. Sc. Phil., 1866, p. 20.

Lampropsar guianensis (not of Cabanis), Cassin, Proc. Ac. Nat. Sc. Phil. 1866, p. 22.

Molothrus sericeus (not *Icterus sericeus* Lichtenstein), Sclater, Cat. Am. Birds, 1862, p. 135, part (Trinidad); Newton, Ibis, 1860, p. 308 (Vieque, West Indies).

Molothrus bonariensis, Cory, Revised List Birds W.I., 1886, p. 35. (St. Thomas); Cory, Auk, 1886, p. 220 (Virgin Islands); Cory, Birds W. I., 1889, p. 107; Cat. W. I. Birds, 1892, p. 124 (Vieque).

M(olothrus) atronitens, Cabanis, Mus. Hein, i, 1851, p. 193 (Cayenne?).

(Molothrus) atronitens, Sclater and Slavin, Nom. Av. Neotr., 1873, p. 37.

M(olothrus) bonariensis (not *Tanagra bonariensis* Gmelin), Cabanis, Mus. Hein, i, 1851, p. 193, part (Venezuela).

Molothrus bonariensis atronitens, Chapman, Bull. Am. Mus. Nat. Hist., XXXVI, 1917, p. 631 (Colombia).

Molothrus bonariensis minimus, Hellmayr, Verh. Orn. Ges. Bayern, XIV, 1920, p. 281 (syn.); Friedmann, Auk, 1927, p. 501.

Molothrus ater, (not Bodd.). A. Koppler, Holländisch-Guiana, 1881, p. 165.

Molothrus bonariensis venezuelensis

Molothrus venezuelensis, Stone, Auk, 1891, p. 347 (orig. descr.); Brabourne and Chubb, 1912, p. 435.

Molothrus discolor, (not *Passerina discolor* Vieillot) Nouv. Dict. d'Hist. Nat. xxiv, p. 552; not Sclater and Salvin, Proc. Zool. Soc. Lond. 1870, p. 509), Cassin, Proc. Ac. Nat. Sc. Phil., 1866, p. 20.

Molothrus bonariensis venezuelensis, Cherrie, Science, Bull., Mus. Bklyn Inst. Arts and Sc., 1916, pp. 210-211 habits, etc.); Friedmann, Auk, 1927, p. 501.

Molothrus bonariensis occidentalis

Xanthornus purpurascens, Hahn, Vog. aus. Asien, Lief, v. t. 4; Voeg. As Af. etc., pt. v. pl. 4, 1819.

Molothrus purpurascens, Cassin, Proc. Ac. Nat. Sc. Phil., 1866, p. 20; Sclater, Proc. Zool. Soc. Lond. 1869, p. 148 (Lima); Sclater and Slavin, Nom. Av. Neotr. 1873, p. 37; Tacz. Proc. Zool. Soc. Lond., 1874, p. 523, et 1880, p. 200 (Peru); Sclater, Ibis 1884, p. 7 (monograph); Stone, Auk 1891, p. 347 (monograph); Sclater, Cat. Birds, Brit. Mus. xi, 1886, p. 337 (descr., range etc.).

Molothrus occidentalis, Berlepsch and Stolzmann, Proc. Zool. Soc. Lond., 1892, p. 378; Brabourne & Chubb, 1912, p. 435.

Molothrus bonariensis occidentalis, Bangs and Noble, Auk, 1918, p. 459 (Peru), Friedmann, Auk, 1927, p. 502.

Molothrus bonariensis aequatorialis

Molothrus bonariensis aequatorialis, Chapman, Bull. Am. Mus. Nat. Hist., XXXIII, 1915, p. 661; Todd and Carriker, Annals Carnegie Mus., XIV, 1922, p. 477; Chapman, Bull. Am. Mus. Nat. Hist., XXXVI, 1917, p. 631; Friedmann, Auk, 1927, p. 502.

Molothrus bonariensis cabanisii

Molothrus discolor (not *Passerina discolor* Vieill., not Cassin, Proc. Ac. Nat. Sc. Phil., 1866, p. 20), Sclater and Slavin, Nom. Av. Neotr., 1873, p. 37, et Proc. Zool. Soc. Lond., 1879, p. 509 (Antioquia); Salvin and Goodman, Ibis, 1880, p. 123 (S. Marta).

Molothrus cassini, Finsch, Proc. Zool. Soc. Lond., 1870, p. 576; Berlepsch, Journ. f. Orn., 1873, p. 250; Sclater, Ibis, 1884 p. 6 (monogr.); Sclater, Cat. Birds Brit. Mus. xi, 1886, p. 337 (descr. range. etc.); Allen, Bull. Am. Mus. Nat. Hist. XIII, 1900, p. 163; XXI, 1905, p. 291.

Molothrus robustus Cabanis, MS. teste Finsch, *l. s. c.*

Molothrus cabanisii Cassin, Proc. Ac. Nat. Sc. Phil., 1866, p. 13, 22; Giebel, Thes. Orn. II, 1875, p. 609 (ref. orig. descr.; syn. (error.)); Sclater, Ibis 1884, p. 166

(ref. orig. descr.); Stone, Auk, 1891, p. 346 (monogr.); Brabourne and Chubb, 1912, p. 435 (ref. orig. descr., range).

Molothrus bonariensis cassini Chapman, Bull. Am. Mus. Nat. Hist., XXXIV, 1915, p. 662.

Molothrus bonariensis cabanisi Chapman, Bull. Am. Mus. Nat. Hist., XXXVI 1917, p. 631 (range).

Molothrus bonariensis cabanisii Todd and Carriker, Annals Carnegie Mus. XIV, 1922, p. 476 (Santa Marta); Friedmann, Auk, 1927, pp. 502-503.

Molothrus bonariensis milleri

Molothrus bonariensis, Stone, Auk, 1891, p. 345 (part); Brabourne and Chubb, Birds S. Am., 1912, p. 434 (part).

Molothrus bonariensis milleri Naumburg and Friedmann, Auk, 1927, p. 494 (orig. descrip. range, plumages, etc.); Friedmann, Auk, 1927, p. 503.

Molothrus bonariensis melanogyna

Molothrus sericeus Pelzeln, Orn. Bras., 1871, p. 200 (part).

Molothrus bonariensis, Stone, Auk, 1891, p. 345 (part); Brabourne and Chubb, Birds S. Am., 1912, p. 434 (part).

Molothrus bonariensis melanogyna Stzolcman, Annales Zoologici Musei Polonici Hist. Nat., tom. v, 1926, pp. 194-195 (orig. descript., range, plumages, etc.); Friedmann, Auk, 1927, p. 503.

(?) *Molothrus murinus,* Pelzeln, Zur. Orn. Bras., 1871, p. 199.

VI.

SUBGENUS MOLOTHRUS

MOLOTHRUS ATER

The North American Cowbird

Key to the Subspecies

A. Body blackish with greenish metallic sheen ....males
  B. Wing length less than 105 mm. ....*obscurus*
  BB. Wing length more than 105 mm.
    C. Wing length more than 112 mm. ....*artemisiae*
    CC. Wing length less than 112 mm. ....*ater*
AA. Body not blackish; with no metallic sheen ....females
  B. Wing length less than 95 mm. ....*obscurus*
  BB. Wing length more than 95 mm.
    C. Wing length at least 100 mm. ....*artemisiae*
    CC. Wing length less than 100 mm. ....*ater*

Geographic Range

Ridgway, (1902, p. 208), gives the following as the range of the typical race of the Cowbird, *Molothrus ater ater.* "Temperate North America in general, except portions of the Pacific Coast; north to about 49° in more eastern portions, to 55° 30′ (Lesser Slave Lake, etc.) in the interior; west to British Columbia (both sides of the Cascade range), Washington, Oregon, Nevada, and southeastern California; south in winter to central and southeastern Mexico (Jalapa and Orizaba, Vera Cruz; Huexotitla, Puebla, Hacienda San Juan Capistrano, Zacatecas; Cozumel Island, Yucatan, etc.); breeding south to Georgia (Wayne and McIntosh Counties), Louisiana (Petite Anse Island), and Texas (Harris and Bexar Counties)."

If we add to this the range given by the same author for the dwarf race, *Molothrus ater obscurus* (p. 210), we get the range for the entire species. To the above data should be added the greater part of Mexico, including Lower California, and contiguous portions of the United States; south to Oaxaca (Cuicatlan, Oaxaca, Tehuantepec City, etc.), Colima (Manzanilla Bay), Jalisco (Bolaños, etc.).

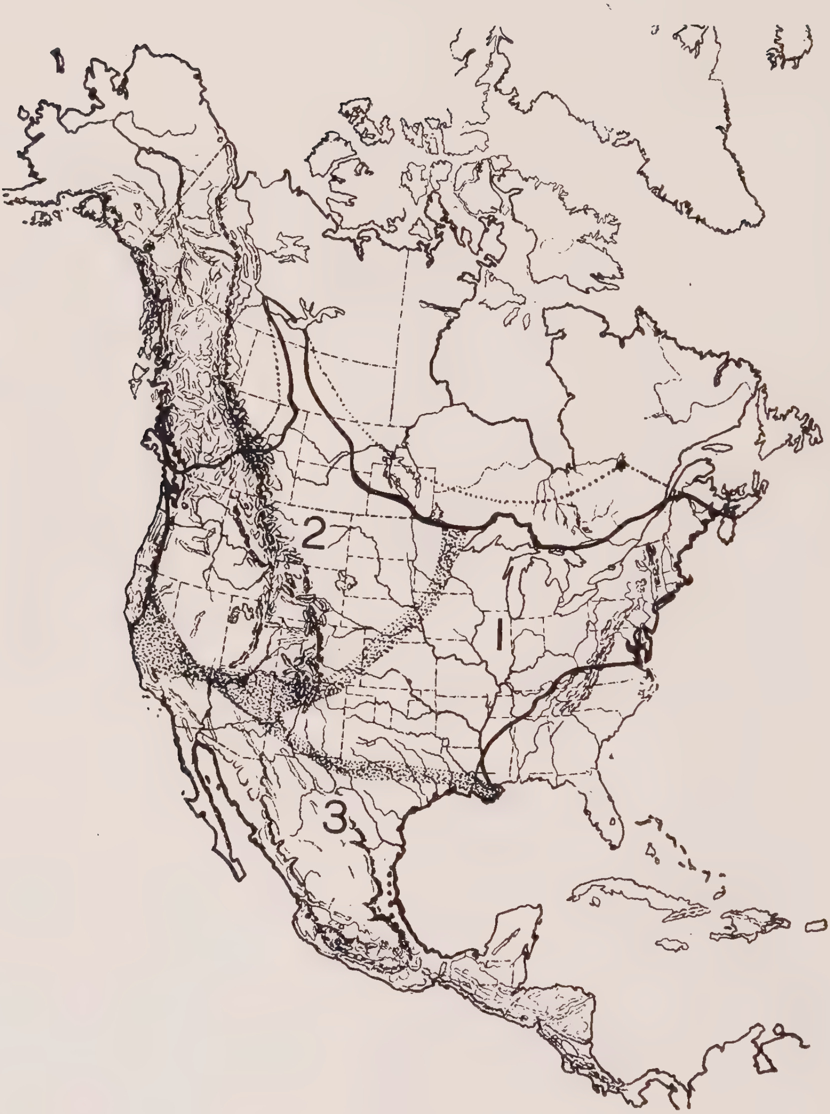


FIG. 6.

GEOGRAPHIC DISTRIBUTION OF MOLOTHRUS ATER.

1.—Range of *Molothrus a. ater.*
2.—Range of *Molothrus a. artemisiae.*
3.—Range of *Molothrus a. obscurus.*
Dotted areas—uncertain or intermediate.
Northern boundary: probable boundary dotted line; actual records—heavy line.

Wayne (Birds of S. Car., 1910, p. 108) questions the range given to Ridgway in respect to Georgia (Wayne and McIntosh Counties). He writes: "Professor Ridgway states that it breeds in Wayne and McIntosh Counties, Georgia, but he does not mention the authority in the citations. From my experience in these counties I consider this breeding record probably erroneous, for I failed to find any birds . . . . there during a part of May, 1891." The authority on which Ridgway based his statement was H. B. Bailey, "On a Collection of Eggs from Georgia," (Bull. Nut. Orn. Club, 1893, p. 39), in which Bailey writes of the Cowbird:— "Eggs laid in the nest of small birds; one with a set of Red-eyed Vireo's eggs." Apparently but a single egg was collected and no real intimation is given as to whether any others were noticed. Of course a single egg could not have come from both Wayne and McIntosh Counties, and this lack of certainty together with the fact that this is far south of the nearest known breeding area, tends to vitiate the record. At any rate, even if the Cowbird did once breed in either of these counties, it was such an unusual occurance, that we can hardly extend the breeding range of the Cowbird southward over two whole states and parts of two others on the basis of a lone, indefinite record.

In the interior of the continent the Cowbird ranges a good deal further north than Ridgway mentions. He gives 55° 30′ (Lesser Slave Lake, etc.), as the northern limit, while more recently Preble, (N. Amer. Fauna 27, p. 407), says that the Cowbird occurs northward at least to Fort Simpson. Fort Simpson is nearly 62° N. Lat., and approximately 122° W. Longitude. This is some 6° 30′ farther north than Lesser Slave Lake. Mr. Francis Harper tells me that he found the Cowbird very common at 59° on the Athabaska delta. DeKay (1844, p. 143) writes that the Cowbird has been observed as far north as the 68th parallel, but this is undoubtedly a mistake.

Some idea of the northern boundary of the Cowbird's breeding range may be obtained by connecting the most northern breeding records across the continent, as has been done in the accompanying map (Text Fig. 6). Beginning at the Pacific coast at Metlakatla, B.C., the line passes through Quatsino and Victoria, Vancouver, then on to Sumas, Chilliwack, Penticton, Okanagan, Ducks, Lac La Hache, and Revelstoke, B.C., going eastward through Banff, Red Deer, Stony Plain, Edmonton, Sturgeon River, Athabaska Landing, Lesser Slave Lake, Grand Rapid, Brule Rapid, Alberta, to Fort Simpson, Fort Providence, Hay River and Fort Resolution, Mackenzie, to Poplar Point, Fort McKay, and Fort McMurray, and Vagreville, Alberta and on through Dinsmore, Prince Albert, Wingard, Osler, and Qu'Apple, Saskatchewan, to Shell River, Grand Rapids, Oak Point, Selkirk, and Portage la Prairie, whence it comes south to Pembina, in northeastern North Dakota. From here it passes eastward by way of St. Vincent, Leech Lake, and Duluth, Minnesota, and then along the north shore of the Great Lakes. We may pick up the line again at Missinabi, Ontario, and follow it through to its eastern end, going along the north shore of Lake Superior, and Huron and Georgian Bay to Beaumaris, Ontario, to Hull and Quebec, north to Lake Mistassini, to Beauport, Quebec, to Woodstock, N. Brunswick, to Petticodiac, N. Brunswick, to Dartmouth, Nova Scotia.

Along the Atlantic seaboard, the Cowbird breeds south to Ashland and Eagle Rock, Virginia. It does not breed in the Appalachian Mountains south of Eagle Rock, Virginia, White Sulphur Springs, and Coulberg, West Virginia. From Coulberg, West Virginia, the line extends through Eubank, Bowling Green, and Russelville, Kentucky, to Nashville, Tennessee, to Anna, Illinois, to Grandia, Missouri, to Newport, Clinton, and Arkadelphia, Arkansas, to Mer Rouge, Franklin Parish, Valverda, Baton Rouge, and St. Mary Parish, Louisiana.

The western boundary of the Cowbird's range does not follow the Pacific coast. Beginning at Victoria, Vancouver, the line runs through Tacoma, Chelan, Cheney, and Willows Junction, Washington, to Bridge Creek, Hay Creek, Burns, Rock Creek Sink, and Plush, Oregon, to Pitt River, and Alturas, California, to Mountain City, Halleck, Ruby Valley, and Pahranagat Valley, Nevada, to Furnace Creek and Independence, California, to Buena Vista Lake, Yermo, Pasadena, Danby, Warren's Falls, Mecca, and Cuyamaca Mountains, California, to Yuma, Bill William's River, New River, Phoenix, Sacaton, Florence, Oracle, Santa Catalina Mountains, Tuçson, Papago Indian Reservation, Santa Rita Mountains, and Huachuca Mountains, Arizona.

Cowbirds have been observed further west than this line during the breeding season, but not breeding. The westernmost point of this kind is the Farallones Islands, off the California coast. This was doubtless an exceptional case as it has never been repeated.

The southern limit of the Cowbird's range is not as well known as its other boundaries but probably coincides with the extent of the Upper and Lower Austral Zones in Mexico south to Colima, Oaxaca, and Vera Cruz.

From the above data it may be noted that the Cowbird breeds in the Canadian, Transition, and both Austral Zones, its range not quite touching the southern boundary of the Hudsonian Zone, and stopping short of the northern limit of the Tropical. The typical form of the bird, *M. ater ater,* does not range into the southern part of the Lower Austral except in winter, and the dwarf race, *M. ater obscurus,* never gets as far north as the northen limit of this same life zone.

It may be that in the vicinity of Vera Cruz, Mexico, the dwarf race of the Cowbird does get into the Tropical Zone but probably it stops just short of it.

While some of our birds, such as the Red-winged Blackbird and the Song Sparrow, have wider and more extensive ranges, yet the range of the Cowbird covers a vast amount of territory, and is certainly ample proof of the ability of the species to maintain itself.

The center of abundance of the Cowbird seems to be the plains and prairie region west of the Mississippi, although it is one of the common birds in most of the eastern states, north of Virginia, as well. At least it is said to be a far more conspicuous element in the scene in the rolling grasslands of the middle west than in most parts of the east. It is scarce in parts of the South Atlantic and Gulf States even as a migrant or winter visitant, and never common on the eastern seaboard north of southern Vermont, New Hampshire, and Maine. It is also scarce in the extreme western part of its range—in British Columbia, Washington, Oregon, and western Idaho.

In mountainous regions, the altitude to which the Cowbird ranges varies with the latitude. But little data on the vertical range of birds has been published, although mountain ranges have been fairly well mapped into their respective life zones. Drew (Auk, 1885, p. 16), in Colorado, gives the vertical range of the Cowbird in spring as up to 6,000 feet, while in summer it breeds from the plains up to 8,000 feet. His differentiation between spring and summer is rather ambiguous as the former has doubtless to do with the range during migration, while the arrival of breeding birds at 8,000 feet, (and they must arrive there if they are to breed there), is just as much a part of the true migration as is the arrival of the first individuals in early spring.

In the files of the Biological Survey at Washington, there is a field note by M. Cary to the effect that on August 13, 1906, at Park Range, Colorado, a female Cowbird was seen with some horses. The altitude at that place was 9,500 feet. While it is highly possible that the Cowbird might wander higher up the mountains after the breeding season, it is certainly rather improbable that it would ascend some 1,500 vertical feet. This makes it seem likely that Drew's limit for the breeding season is not high enough.

Under the general heading of geographical range, it may be well to notice that the status of the species is by no means constant in all parts of its range. Thus Williams, in Leon County, Florida, (Auk 1904, p. 457), writes that the Cowbird ". . . . exists now in vivid recollection only. The bird was common in Leon county up to 1893, since which time I have never seen a single specimen, although I have made every effort to find it." From this it may be seen that the winter range of the Cowbird is subject to local change. That the breeding area also changes locally in density of molothrine population is likewise true. Kumlien and Hollister (1903, p. 87) write that in Wisconsin, "The Cowbird is, without question, increasing steadily in numbers." Steady increases have also been reported from Ohio, and Wyoming (Grove, Am. Nat. 1913, p. 312).

Just exactly how extensive the range of the Cowbird was when this continent was first explored will be probably never be known, but it is certain that its distribution has been markedly affected by the colonization and settling of the country. Never a bird of the deep forests, its range has been greatly increased by the destruction of large tracts of timber to make way for the plow and the scythe. In much of the farming country of the Ohio Valley and the Middle Atlantic States the Cowbird is one of the commonest birds, and yet, hardly a century and a half ago, a great part of this area was covered by virgin forest, and the Cowbird was not only not present, but could not have established itself had it tried, because of the very nature of the country, if for no other reason.

Deforestation has not been the only factor resulting from civilization that has been instrumental in enlarging the range of the Cowbird, although it unquestionably has been the most potent one. Irrigation of the arid desert country of the southwest has rendered considerable territory more suitable to the Cowbird than it formerly was, and the draining of swamps and marshes has likewise contributed to the formation of good farming country, which usually means good Cowbird territory.

Another factor synchronous with the deforestation and settling of the country was the added impetus for the Cowbird to wander beyond its former limits, supplied by the presence of cattle on the newly cleared homesteads. The Cowbird originally attended and followed the herds of buffalo, and possibly the antelopes and other large game. The fencing off of field after field and pasture after pasture, in time limited the range of the Cowbird's four-footed associates, but cattle provided the same invitation to the birds that had previously been offered by the indigenous ruminants. It seems not impossible that the presence of cattle on the former pastures of the bison materially aided in the rapid extension of the bird's range. The Buffalo Bird of the plains of the pioneer days is the Cowbird of the farm pastures of today.

No account of the Cowbird's present distribution would be complete without at least a summary of what we know, or believe, about its geographic origin and center of dispersal. In common with all the other members of its family, the Cowbird is, if we go back far enough, a South American immigrant into this continent. While it may be that some genera of Icterids originated in North America after the family had established itself here, this is quite clearly not true in the case of the Cowbird. The genus *Molothrus* is still essentially a neotropical genus, only one member of which has come to inhabit North America. I think it may be taken for granted that no one familiar with the facts will find anything wrong or improbable in assuming (for such things cannot be proved absolutely) that the Cowbird is as truly of South American stock as any form in the A. O. U. Check-List. The next problem is to determine by what path it left its ancestral home and came to take its place in the North American fauna. There are two paths by which it might have come—by way of Central America and Mexico, or by way of the West Indies. The possibility of a direct flight over the Gulf of Mexico and the Caribbean Sea, which is annually performed by some migrants, is hardly likely as there could have been no instinct to guide the Cowbird over that path before it had ever been in North America. At any rate it is far more likely that the immigration into this continent was a gradual one. All things seem to point to the Central American path as the one that was used. The Cowbird's range still extends into Mexico. Also the Cowbird has never been recorded from any of the islands of the West Indies and does not breed south of Virginia, east of the Mississippi. Probably Texas was the center from which the Cowbirds were dispersed over the North American Continent. This is indicated by the fact that in that state, we find two of the three of the geographic races into which time and environment have differentiated the North American Cowbird. The gently undulating plains west of the Mississippi valley offered an ideal highway for the species to travel and extend its range. As elsewhere stated this same region of open grass-lands is still the center of abundance of the Cowbird.

The Ranges of the Subspecies

Molothrus ater artemisae, Sagebrush Cowbird

a. Breeding Range

United States and Canada, north to Nova Scotia (Dartmouth), New Brunswick, (Woodstock and Petticodiac), central Quebec and southern Ontario (north to Lake Mistassini); west to eastern Minnesota, northern Iowa, northeastern, central, and south-central Nebraska, north-central and southwestern Kansas, and the greater part of New Mexico (except the northwestern corner and the southwestern part of the state); south to central Texas, the greater part of Louisiana (Mer Rouge, Franklin Parish, Valverda, Baton Rouge, and St. Mary Parish), south-central Arkansas, central Tennessee, southeastern Kentucky, and central Virginia; and east to the Atlantic Coast from Ashland, Virginia north to Dartmouth, Nova Scotia. Occasional in Bermuda (2 records T. Bradlee mss.)

b. Winter Range

United States and Mexico, north to Massachusetts, New York, and Michigan, south to Florida, Alabama, Mississippi, Louisiana, Texas and central Mexico (Michoacan).

Type Locality—Carolina

Molothrus ater artemisae, Sagebrush Cowbird

a. Breeding Range

Western North America, north to southern Manitoba, southwestern Mackenzie, and central British Columbia, west to southwestern British Columbia, western Washington, central Oregon, and eastern California; south to south-central and eastern California, southern Nevada, Utah, south-central and east-central Colorado, south-central and northeastern Nebraska, southeastern South Dakota, and east to central Minnesota.

b. Winter Range.

South to Texas, Vera Cruz, and Michoacan, Mexico.

Type Locality—Humboldt County, Nevada.

Molothrus ater obscurus, Dwarf Cowbird

Resident in Mexico and the southwestern United States, north to southern Louisiana, southern Texas, southwestern New Mexico, southern Arizona, and southern California, and south to Colima, Oaxaca, and Vera Cruz, Mexico.

Type Locality—Mexico.

Spring Migration

Review of the Literature

Although brief, incomplete notes on the spring migration of the Cowbird in many parts of its range have been published, detailed accounts are few.

Pennant (Arctic Zoology II 1785 p. 259) wrote that this bird, "Inhabits New York, and appears there in some flocks during summer. Perhaps migrates to St. Domingo . . . . . . " This is the earliest, and possibly the poorest account published The Cowbird has never been recorded from any of the West Indies.

Twenty-five years later Alexander Wilson (Am. Orn. II 1810 p. 147) gave the following account:

"About the 25th of March, or early in April, the Cow-pen-bird makes his first appearance in Pennsylvania from the south, sometimes in company with the Red-winged Blackbird, more frequently in detached parties, resting early in the morning, an hour at a time, on the tops of trees near streams of water, appearing solitary and fatigued. They continue to be occasionally seen, in small solitary parties, particularly along creeks and banks of rivers, as late as the middle of June; after which we see no more of them until about the beginning or middle of October. . . . .

"From the early period at which these birds pass in the spring it is highly probable that their migrations extend very far north. . . . ."

William Bartram recorded the Cowbird at Philadelphia as early as February 23, but most of his dates are from 2 to 3 weeks later.

Audubon's (1842 IV p. 18) account is quite similar to Wilson's, but he notices that, ". . . . the males and females arrive together. . . . ."

Nuttall's account (1840; rev. ed. 1903, p. 104) is fairly complete. He writes that—

"The Cow-pen Bird . . . . is observed to enter the Middle and Northern States in the latter end of March or the beginning of April. They make their migration now chiefly under cover of the night, or early dawn; and as the season becomes milder they pass on to Canada, and perhaps follow the Warblers, and other small birds into the farthest regions of the North. . . . ."

Giraud (1844) found that the Cowbird arrives on Long Island in the early part of April.

Baird, Brewer and Ridgway (1874) wrote that "The Cow Blackbird appears in New England with a varying degree of promptness, sometimes as early as the latter part of March, frequently not until the middle of April."

Cooke, in his report on the migration of birds in the Mississippi Valley in the years 1884 and 1885 gives some interesting data as to the northern movements of the Cowbird.

At San Angelo, Texas, a few more were reported as resident, but most of them going south. In Indian Territory, at Caddo, the bulk of males came January 22; the bulk of species left February 22, and the last disappeared March 24. At St. Louis, the first came March 31, and at Burlington, Iowa, April 7. "So far the dates probably represent somewhat nearly the actual movements of the species." Then severe storms interfered with the migration and invalidated the more northern records.

The dates for the spring of 1885 give an approximate idea of the time of migration in the West. "The first were noted at San Angelo, Texas, March 6; hundreds were seen at Bonham, Texas, March 23; the first were reported from St. Louis, Missouri, March 30; Des Moines, Iowa, April 10; Wauken, Iowa, April 21; Lanesboro, Minnesota, April 23; Heron Lake, Minnesota, April 28; Argusville, North Dakota, May 4; Shell River, Manitoba, May 14. . . . ."

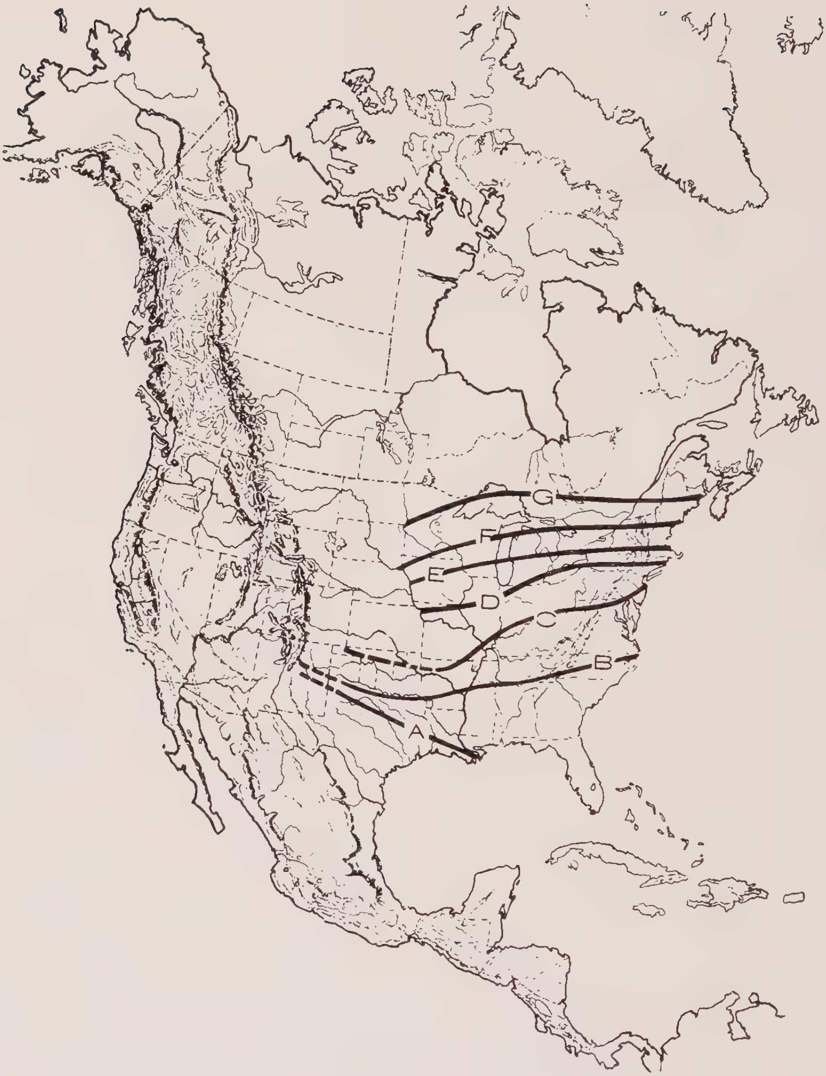


Fig. 7.

Spring Migration of Molothrus ater ater.

A.—March 1.
B.—March 10.
C.—March 20.
D.—March 25.
E.—April 1.
F.—April 5.
G.—April 10.

Eaton (1914 p. 226) in New York writes that the spring migration of the Cowbird is well started by the middle or the 20th of March, the bulk of birds which have migrated southward arriving before the 30th of March or the 10th of April.

Fleming (Auk, 1907 p. 78) gives the first arrival at Toronto, Canada, as April 2.

Mousley (Auk, 1916 p. 168) agrees with Audubon that the females arrive with the males. Widmann, in Missouri (1907, pp. 151-152), writes:

"The very first Cowbirds come in the company of Red-wings, about the first of March, but are easily overlooked as they do not appear in their old haunts, staying with the host of Redwings in the marshes. As is the case with all other March arrivals, the dates of the first Cowbirds vary greatly with the weather from the second week of March to the first week of April. The bulk of the species generally does not come before the first or second week of April and in the more northern part before the second or third week. It is usually not far from April 1 when the first male Cowbird announces from a tree top that he is back again at his old stand and ready for mischief, but it is a week or more before he gets a chance to court. After the females have arrived in force by the middle of April the species becomes for nearly two months one of the most conspicuous, especially in the morning hours when its call note is in the air everywhere, its song coming from the treetops, and restless troops of excited males and females follow or chase each other, the males usually in the majority. . . . ."

Barrows, in Michigan (1912, p. 437), observes:

"The Cowbird arrives from the south about the first of April. . . . . . The males come first and often singly or with flocks of other blackbirds, and it is not until 9 or 10 days after their arrival that they are seen in flocks with the females."

Oberholser (Bird Lore, 1920, pp. 343-345) gives a summary of the migration dates of the Cowbird in various parts of the country. On the map (Text Fig. 7) is shown the advance of the typical form of the Cowbird, *M. ater ater*. The data on *artemisiæ* are not sufficient for graphic representation and many of the data are contradictory. It should be borne in mind that migration cannot be accurately pictured on a map and that the best attempt gives only an approximate idea of the advance of the species. The lines represent the arrival of the first true migrant birds, the vagrants being so irregular as to be entirely unreliable.

Under the general discussion of migration two points more may be mentioned. The first has to do with the time of migration. The Cowbird migrates by day, early in the morning and late in the afternoon. I know of no data tending to show that this species indulges in nocturnal migration, but it may do so to some extent.

The second point is that of migrant associates. The Cowbird commonly migrates with the Red-winged and Rusty Blackbirds and the Grackles; in fact these three are usually found together. Other less common associates are Meadowlarks and Robins in the east, and Brewer's and Yellow-headed Blackbirds in the west.

Doubtless many Cowbirds succumb annually to the perils attendant upon migration but as far as I have been able to find there are no definite records of such happenings. Because they migrate chiefly by day no Cowbirds have been picked up dead around lighthouses or the bases of tall monuments and buildings. Bendire writes that Dr. G. Brown Goode, while on the German Lloyd Steamer *Neckar,* in April, 1880, saw a female Cowbird fly on board, fully 1,000 miles east of Newfoundland. The bird was captured. In this case the bird was undoubtedly blown out of its course by a storm. It appears that some Cowbirds follow the Atlantic coastal plain more or less in their migration. This is borne out by a return record of a banded Cowbird which was banded at Branchport, New York, on October 17, 1921, by Mr. Verdi Burtch and recovered on February 12, 1922, at Youngsville, North Carolina, by J. T. Sanderford.

Spring Migration at Ithaca, New York.

The migration may be best understood by dividing it in several phases. After long familiarity with the Cowbird it becomes possible to distinguish between migrant and resident birds as they arrive from the south. Unfortunately there is no positive way of telling young birds (i. e. 1 year old) from older ones as can readily be done with the Red-winged Blackbird, but yet something can be determined.

The spring migration may be divided into the following phases:

1. Arrival of vagrants
2. Arrival of migrant males
3. Arrival of resident males
4. Arrival of migrant females
5. Arrival of resident females
6. Arrival of immature (?) males and females

1. Vagrants. By vagrants are meant those individuals coming before the true migration. They are probably birds that have passed the winter not far to the south and their movements may be more of the nature of a wandering after food than a true northward migration. Usually a week or more (sometimes several weeks) intervenes between the arrival of these vagrant individuals and the first real migrants. The time of arrival varies, some years no vagrants are observed, while in others several may be found. Usually single birds, these early comers may appear in small bands. Most of the vagrant birds are males, but occasionally females may be found among them. Vagrant males are usually not in song and do not display.

The dates at Ithaca for the arrival of these forerunners of the migrant hosts range from March 1 (1919) to March 14 (1922).

At this time of the year the season is hardly begun and all organic life is in a very low state. The country-side is still dormant and the ice not all gone from the marshes.

2. Arrival of Migrant Males. These are the first true migrants to arrive. All of these individuals go on further north to breed and when they first come have the gonads very slightly enlarged. These birds usually are seen scattered among the flocks of Red-wings, not forming any solid flocks of their own kind. They come to the marshes to pass the night with the Red-wings and the Rusty Blackbirds but during the day scatter over the fields on the uplands, where, in small groups, they forage for food. The date of first arrival of these birds in 1921 was March 18; in 1922, March 23; and in 1923, March 22, the average being about March 20.

About half past five in the afternoon early in the season the Cowbirds begin to come into the marshes to pass the night. They are usually preceded by considerable numbers of Red-wings, i. e., the Red-wings start coming in about half an hour earlier. On the whole these migrant male Cowbirds are rather silent when in the marshes as compared with the noise made by an equal number of Red-wings.

At this season the marsh is still dormant, no green shoots appearing as yet among the charred brown stalks left by the fall fires and winter storms. Skunk cabbages are in bloom in the wet woods fringing the swamps but the vegetation in general is hardly started. The birds feed almost entirely on seeds, chiefly on yellow foxtail (*Chaetochloa glauca*). For over a month these migrant males continue to arrive and depart.

3. Arrival of Resident Males. The exact arrival of the resident males is a matter that takes at least two years to determine. The first year is spent in studying the breeding areas of the Cowbirds, and particularly the singing trees of the males, and the next spring is largely occupied in watching for the return of each male to his post. The resident males on arrival at once establish themselves on their posts and remain in their territories for a few hours early in the morning every day, spending the greater part of the day in foraging around for food, often going to stubble fields, and to plowed areas a little later in the season. As the season advances they spend more and more time in their respective territories and at the time the resident females arrive the males are spending at least half of each day within the limits of their areas. The interval between the arrival of the first migrant and the first resident males is much shorter than in the Red-winged Blackbird, being only three days in the case of the Cowbird as against twelve days in the Red-wing. The testes of these resident birds are noticeably larger than those of the migrants, and as all the birds collected at dusk in the marshes averaged smaller testes than those shot from their singing trees, it seems that the two groups do not associate in the marsh, the resident birds sleeping in their territories. This also shows that the resident birds go at once to their territories and do not linger on the uplands and in the marsh with the migrating individuals. However some of the food taken from the stomachs of these early residents show lepidopterous larvæ which are probably gleaned from the edges of the marshes if not from the marsh itself.

4. Arrival of Migrant Females. The first females to arrive are migrants which pass through on their way northward. They come close on the heels of the migrant males and simultaneously with the resident males, arriving on the average about March 23. At first they come as lone individuals among the flocks of Red-wings, Grackles and Cowbirds, but by the end of the first week in April (when the bulk of the migrant males have gone through) the migrant females come to form flocks of 45 or more. Usually these flocks are smaller, the average being a dozen or so. The males pay comparatively little attention to them, occasionally displaying, but just as often displaying when no female is in sight. The ovaries are only slightly enlarged in the migrant females and the food is chiefly vegetable although insects are eaten when found.

5. Arrival of Resident Females. The arrival of the resident females is best found by watching the actions of the resident males. Until about the third of April they take but little interest in any of the females, but at that time other females arrive to which the males react in a very different fashion. The arrival of these resident females acts as a spark to set off the pent-up energies and passions of the males and arouses them to an unbelievable frenzy. The persistence and determination with which the resident males pursue these females makes one wonder if either ever rest. The females evidently recognize the limits of the territories of their respective pursuers as they usually fly in wide circles closely followed by one or more males, but do not leave the general vicinity of their territories. The ovaries of these resident females are considerably larger than those of the migrant birds of the same date. All these females seem to arrive within a week, the extremes for 1922 being April 3 and April 11.

6. Arrival of Immature (?) Males and Females. About the beginning of May or even the last of April all the resident birds are established and no more migrants are to be found coming in to the marshes. There is a decided slump in the migration lasting until about the second week of May when suddenly there appear numerous flocks of Cowbirds of mixed sexes in the upland fields, around the cattle, and near barns. Inasmuch as the migrant males and females have all left by this time and the resident birds keep to their territories it seems as though these sudden increments are to be looked upon as immature, or year-old birds. In plumage they are identical with older birds and so readily pass for them. I never found any with juvenal feathers still present and so cannot be absolutely sure that these are immature birds but this suggestion is strengthened by the following facts. 1. The gonads of these birds are smaller than those of the only other Cowbirds then present (resident birds). 2. The males do not seem to take much notice of the females as do the resident birds, and as did the last of the migrants to some extent. These two facts point to the conclusion that these birds are really the immature individuals. Probably the first flocks to arrive are migrants and the later ones resident birds, but on this point I cannot be sure. I also am not able to say when the last of these birds arrive as they move around from place to place and so make it impossible to determine whether they are new arrivals or merely wandering resident flocks.

Summary of Spring Migration at Ithaca

Below are tabulated the dates of the arrival of the different groups of Cowbirds at Ithaca. The first date is the actual date when first seen, the last date is only approximate. Average dates are given for 1921-1923 only, with two exceptions, since data on other years is not sufficient (except in one case) to determine averages for a longer period of years.

Vagrants	March 1-March 14 (1919-23)
Migrant Males	March 20-April 27
Resident Males	March 23-April 8
Migrant Females	March 23-April 28
Resident Females	April 3-April 11 (1922)
Immature (?) Males and Females	May 10-

Courting and Mating

Review of the Literature

Detailed, accurate studies of the courtship habits of birds are a recent development in ornithology. For this reason the older accounts are of less importance in a study of this phase of a bird's activities than in almost any other.

Wilson (1810, pp. 161-162) put a nestling Cowbird, taken from a nest of a Maryland Yellowthroat, in a cage with a Cardinal, and later observed as follows:

"This Cowbird is not six months old, is in complete plumage, and repays the affectionate services of his foster-parent with a frequent display of all the musical talents with which nature has gifted him. These, it must be confessed, are far from ravishing; yet for their singularity are worthy of notice. He spreads his wings, swells his body into a globular form, bristling every feather in the manner of a turkey cock, and with great seeming difficulty utters a few low, spluttering notes, as if proceeding from his belly; always, on these occasions, strutting in front of the spectator with great consequential affection.

"To see the Red-bird, who is himself, so excellent a performer, silently listening to all this guttural splutter, reminds me of the great Handel contemplating a wretched cat-gut scraper. . . . ."

Nuttall (1840; rev. ed., 1903, pp. 105, 108), writes that, ". . . . the flocks live together without ever pairing. A general concubinage prevails among them, scarcely exciting any jealousy, and unaccompanied by any durable affection. . . . .

"The song of the Cowbird is guttural and unmusical, uttered with an air of affectation, and accompanied by a bristling of the feathers and a swelling of the body in the manner of the Turkey. . . . . Sometimes the tones of the male resemble the liquid clinking of the Bobolink and the Red-winged Blackbird. Sitting on the summit of a lofty branch, he amuses himself, perhaps for an hour, with an occasional *kluck tsee,* the latter syllable uttered in a drawling hiss like that of the Red-wing."

Coues (Birds of the Northwest, 1874, p. 185) writes as follows:

"Polygamy is rare among higher birds; in no creatures are the paternal and conjugal instincts more strongly developed or beautifully displayed. But the Cowbird illustrates this mode of life, and not in the lordly manner of the barnyard cock, so devoted to his harem, so gallant and just to all. As in this species, there is no love of offspring, neither can there be conjugal affection; all family ties are dispensed with. The association is a mere herding together in quest of food in similar resorts. The Cowbirds never mate; their most intimate relations are no sooner effected than forgotten: not even the decent restrictions of a seraglio are observed; it is a perfect community of free lovers, who do as the original cynics did. The necessary courtship becomes in consequence a curiously mixed affair. During the season corresponding to the mating season of orderly birds, the patriarchs of the sorry crew mount up the trees and fences, to do what they call their singing. They posture and turn about, and ruffle their feathers to look bigger than Nature made them; if their skins were not tough they would certainly burst with vanity. They puff out their throats and pipe the most singular notes, perhaps honestly wishing to please their companions of the other sex—at any rate, to their own satisfaction. Meanwhile the females are perched nearby, but without seeming very enthusiastic—rather taking it all as a matter of course, listening at times, but just as likely preening their plumage, with other thoughts and an ulterior purpose. The performance over, it is a very little while afterwards when the whole band goes trooping after food in the nearest cattle-yard or pasture."

The literature of the different types of display is included in the discussion of each type and need not be given here.

The Courtship Habits of the Cowbird

The Cowbird has three types of display, depending upon whether the bird is on the ground, in the air, or in a tree at the time. These I have termed the terrestrial, the aërial, and the arboreal displays, respectively.

In the terrestrial type there seems to be considerable variation; more than in the arboreal. On April 25, 1921, I watched a pair of Cowbirds on the lawn in a cemetery. To quote from my field notes:—"The male would run alongside of the female, and when slightly ahead of her would turn a little so as to be placed somewhat diagonally to her, and would then ruffle the feathers of his neck and the interscapular region. Then he would bow or bend down his head a little and emit his squeaky, shrill note—*pseeee.* The wings and tail are not involved in the terrestrial mode of courting." I observed this on several occasions during 1921 and 1922.

Dr. C. W. Townsend, who has spent much time and energy in studying the courtship behavior of our birds sends me the following notes concerning the terrestrial courtship antics of the Cowbird.

> April 9, 1922—Three males and one female busily engaged in eating in a field. Every now and then a male would look up, puff up feathers, spread wings and tail and fall on head. This is evidently the bowing as in trees where he does not fall. Since this time I have seen the performance several times and it always impressed me as a falling and being stopped by his head and breast striking the ground. . . . . It seems to me that the tree act is a low bowing, while on the ground act is an actual fall, for the bird suddenly lets himself go and brings up against the earth, a comical procedure.

The second, or aërial, type of display is hardly worthy of special designation on any equal footing with the terrestrial and arboreal antics, as it is rather rarely indulged in and not well marked at best. My field notes on this type are few. On April 3, 1922, I watched three males pursuing a single female.

> One of the males left and a second female came, and chased the two males and the female. The first (original) female was always in the lead with the two males close behind her, singing and attempting to display in mid-air, while the second female brought up the rear. After about thirty minutes the second female flew off. The display of the males in mid-air consisted of ruffling out the feathers of the neck, interscapulars and throat, bending down the head, and arching the wings more than in usual flight, and giving their squeaky song. During the instants when the wings were arched in display the flight seemed unsteady, a sort of half-hearted attempt at a glide during an unaccustomedly long interval between wing beats. Both males seemed to display and sing in unison. The two males and the female kept on flying back and forth, at an altitude of about two hundred feet, from 7:15 A.M., when they first were seen, until about 8:30 A.M., when they were last seen, without resting or alighting even for a second.

Townsend, (Suppl. Birds of Essex Co., p. 129), in describing the song of the Cowbird, says ". . . . It is a pleasing liquid note. This is evidently the true courtship song, and is sometimes performed on the wing. I have seen three males chasing a female uttering these notes as they flew. . . . ."

The third, or arboreal type is the commonest, best known, and most typical of the three. It is the display described by writers as everything from gallant bowing to motions suggestive of extreme nausea.

Wetmore, in New Mexico (Auk, 1920, p. 402), describes the display as follows.

> . . . . the bird would rest quietly for a few seconds, then expand the tail and draw the tip slightly forward, erect the feathers of the back and to a less extent those of the breast and abdomen, and then sing *bub ko lum tsee.* In giving the first three notes he rose twice to the full height of his legs and sank back

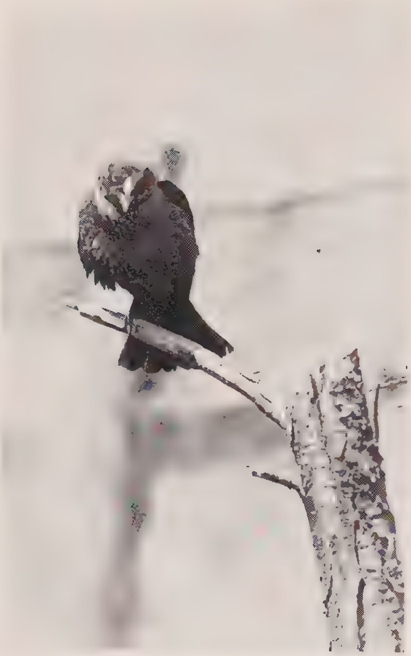


Fig. 1.

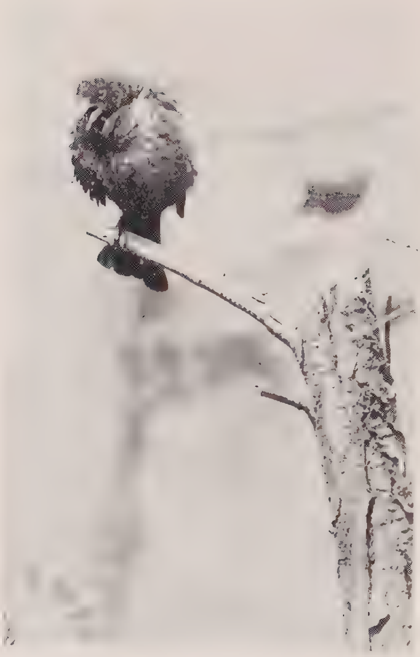


Fig. 2.

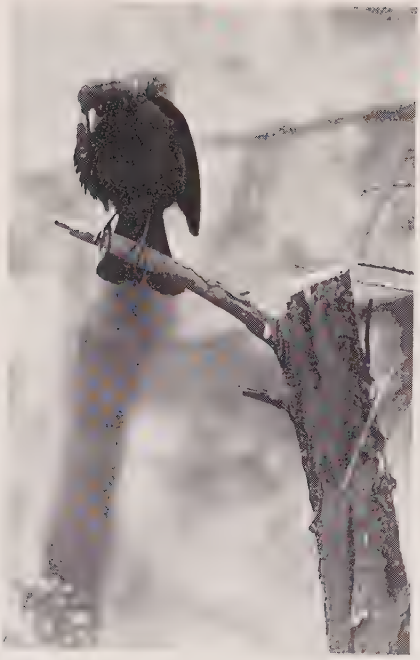


Fig. 3.

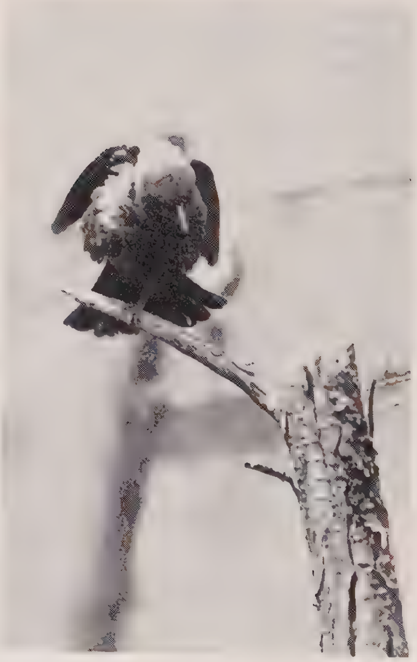


Fig. 4.

PLATE XVII.

Molothrus ater. Courtship Display.

Fig. 1. Fluffing feathers and spreading tail.
Fig. 2. Beginning to arch neck and giving first bubbling notes.
Fig. 3. Beginning to raise wings.
Fig. 4. Raising wings; tail fully spread.

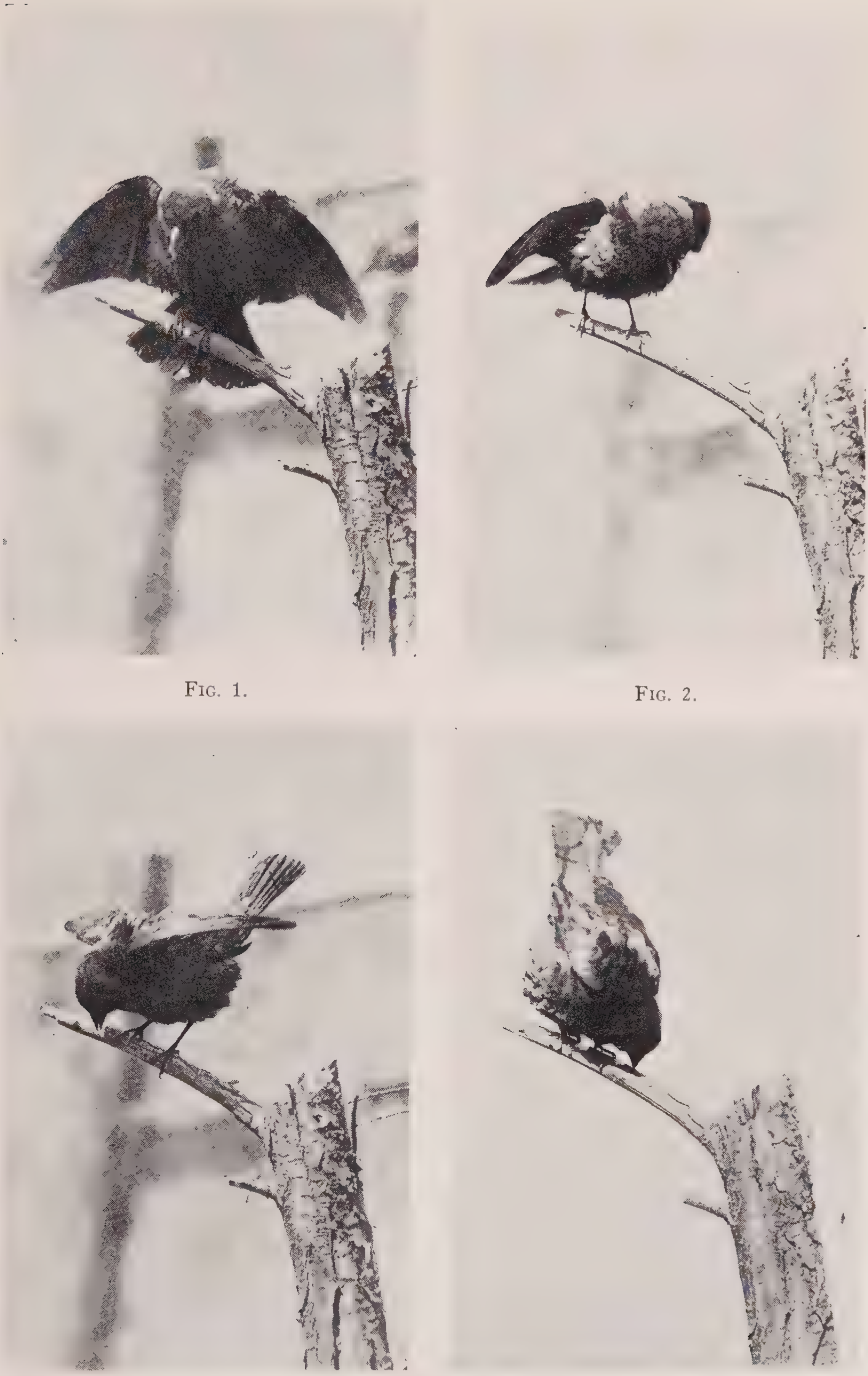


Fig. 1. Fig. 2.

Fig. 3. Fig. 4.

PLATE XVIII.

Molothrus ater. Courtship Display.

Fig. 1. Wings brought up higher.
Fig. 2. Bending forward; body nearly horizontal.
Fig. 3. Bowing forward; tail well up.
Fig. 4. All the way over; wings brought back to side; end of display.

quickly. After singing the bird relaxed and sat for a short time. . . . . The original male then began to sing, opening his wings wide and then closing them again in addition to his other motions, and at times nearly overbalancing in the violence of his displays.

I have paid much attention to the courtship of the Cowbird and not only have numerous and complete field notes been made, but observation in the field has been checked by watching at very close range, the display of two males in an observation cage. Added to this, some idea of the possible origin and development of the display has been arrived at as the result of study of the development of the display of young males in captivity. The display of the captive birds in all cases has been very carefully compared with the same behavior in their wild relatives and found to be identical. The photographs illustrating the various stages of the display are all taken from birds in the observation cage mentioned above.

The display is often, but not always, begun by the bird pointing its bill toward the zenith. This is usually done whenever another bird, especially another male, is very close to the displaying bird. Next it fluffs out the feathers of its hind neck, breast and sides and flanks, (figs. 1, 2, Plate xvii). It is during this part of the display that the bubbling guttural notes are given. Wetmore has written it *bub ko lum* and I cannot improve on his description. These notes are quite low and not audible in the field at a distance of more than fifty feet. During this stage of the performance the bird sometimes rises and falls gently on its legs in a vertical direction, the rise hardly ever amounting to as much as the length of the tarsus.

After this the bird begins the display proper by arching its neck and spreading its tail (fig. 3, Plate XVII). Then it begins to raise its wings and bend forward (fig. 4, Plate XVII). Fig. 1, Plate XVIII, shows this carried just a little further. All this time the feathers of the back are fluffed out just as are those of the underparts. Then the wings are brought out to their full expanse (fig. 2, Plate XVIII), and the toppling over proceeds from now on with accelerated rapidity, the tail being lifted before the body pivots and swings over. This is shown in figs. 2-3, Plate XVIII. The display ends when the wings are brought back to the body (fig. 4, Plate XVIII). The bird then rights itself and is ready to repeat the whole performance.

While it is spreading and arching its wings it starts to emit a high, shrill, thin, squeaky, *tseee* which is prolonged until the forward fall is completed. It does not sing as it comes up again. The *tseee* note is much higher and thinner than the *ttshay* of the Red-wing or even the corresponding note of the Rusty Blackbird. At times it bears considerable resemblance to the *dee* of a Killdeer, but is not harsh and lacks the idea of coldness that the note of the Killdeer seems to have. The Cowbird's note has a liquid quality that is absent in the Killdeer's. Other bird sounds that might be confused with the song of the Cowbird are the notes of the Cedar Waxwing, which may be told by their wheezy character, being more buzzy and throaty than are the Cowbirds'.

When the Cowbird spreads its wings in its display it balances itself for a second before going over as though hesitating before taking the forward fall. It sometimes spreads and retracts the wings a couple of times before going over, but usually this is done but once. Up to this stage, the bird sometimes performs on only one foot, as in the photographs, but after this both feet are invariably used. The reason is obvious enough, as too much support cannot be had during the falling over.

The entire display lasts about three or four seconds and the *tseee* note usually has a duration of about a second or a little over. The frequency of display is extremely variable. I have seen a male display with almost clock-like regularity at intervals of five seconds for several minutes when no female was in sight, and I have also watched a male display once and not do it again for over an hour. Display becomes less and less frequent as the season wears on and is usually not indulged in to any extent after the middle of June, while song continues until a month later. Those displays that are given after the middle of June are usually incomplete. This incomplete display consists of spreading the tail, hunching the back and slightly arching the wings, but the bird does not fall forward. On July 5, 1921, I watched a small flock, three males and two females, in a tree in a cow pasture. All the males showed the first indications of molt especially in the breast and scapulars where little patches of lightish down showed among the black. In spite of this one of the males did actually sing and display before one of the females.

Bicknell (Auk, 1885, pp. 152-154) writes that—"On October 8, 1882, I watched the male of a pair of Cowbirds striving, and with some success, to produce before its mate its full spring song, not forgetting the associated bodily contortions. Such behavior, in an autumn bird, was at least highly unseasonable, if not suggestive of illegitimate intentions."

It is difficult to treat of the song and call notes separately as all are intermingled to a great extent in the life of the bird. However, a clearer understanding of them requires individual treatment.

The true song of the species is confined to the male, and is given not later than the middle of July as a rule. Bicknell (Auk, 1885, pp. 152-154), writes that:

> "Cowbirds are somewhat uncertain and capricious in the use of their voices, and show much variability in different years in the continuousness of song. As a general thing this singing is infrequent in June, although extending through this month and into July. At this time the half song is almost exclusively in use, but the bubble notes may be produced as long as the bird remains in voice. Dates of latest songs of the first period range from July 5 to 23." The same writer describes the true song as follows. "The song-utterance of this species, although giving a slight reminder of its near relationship to the Blackbirds, is nevertheless strikingly unique. It has an indefinite beginning, which is continued into a high attenuated note, ending with a sound curiously like that of bubbling water. This irresistibly suggests a bubble-like bursting forth of sound after a long audible inhalation. It seems to be a sort of appendage to the ordinary song-notes, and is, perhaps, achieved only by vigorous individuals, or under the stimulus of courtship."

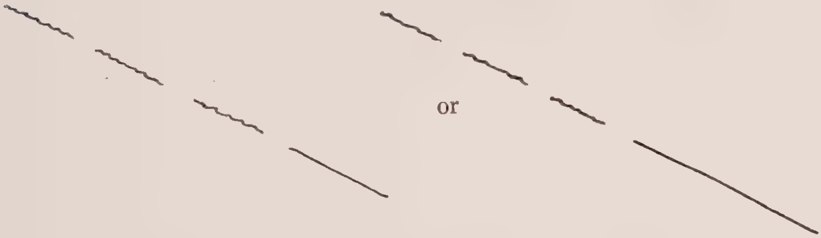
Minot (3rd Ed. ed. by W. Brewster, p. 257) describes the song as ". . . . a clear, pensive, but rather shrill whistle usually followed by a few similar but falling notes."

Chapman (1900, p. 176) calls it a ". . . . long-drawn-out, glassy *kluck, tse-e-e.* Later, when wooing the female he utters a curious gurgling note, resembling the sound made by pouring water rapidly from a bottle. . . . ."

Fry (Auk, 1916, p. 36), in his study of the seasonal decline of bird song, writes that Cowbirds were ". . . . heard at intervals up to about July 17. Whether or not any diminution had begun before the first could not be determined, but probably not. After the 17th they were rarely heard and the last record is on the 23rd."

The true song is the one described in the account of the arboreal courtship, the *bub ko lum tseee,* as Wetmore writes it. The last note is frequently broken up into a long and two short ones, the long one coming first.

Very little is known about the actual mating notes of the Cowbird, or of any bird, for that matter, the subject usually being omitted from life histories. While trying to obtain a complete series of pictures of the arboreal display of the captive males, it was found that they would display to a mounted female. Later the mounted female was tied to the branch where the males used to display, and immediately the males came to it and displayed, and what is still stranger (and quite unexplained) tried to copulate. The female had been given a slight coat of red paint on the head and breast, but this did not make any difference to the males, who had been without a female for about two months (in the heart of the breeding season). In this way I was able to get data on the actual mating notes of the male, which would otherwise have been very hard, if not quite impossible, to obtain. When the male got on the back of the mounted female and attempted copulation, he gave a series of clear, high, rather liquid, rapidly successive notes much like one of the Starling's notes in quality. The mating song was high, shrill, and in a descending scale, and composed of four notes; the first a long, clear, *sssss,* followed by three wavering, descending notes. In trying to write it, I arrived at two interpretations, as follows:—*ssss-ster-s-sss* and *ssss-ter-ra-ter.* The first note, which was not wavy, varied in length. The mating notes may be represented graphically as follows:



The call notes of the male are of four kinds,—the flight whistle, the call to the flock, the feeding note, and the note given when interest in a female is aroused. The first of these is the best known, and is not always given only in flight, but frequently as the bird is sitting in a tree. I have called it the flight whistle because I have yet to see a male start flying without giving this note. The whistle varies considerably, but is often of the following sort. First a thin, wheezy, inhaling squeak, *whsssss,* and then an equally thin, but not so wheezy, exhaling whistle, *pseeee.* The first note is apparently given as the bird inhales and the second as it exhales, but sometimes it sounds as though the order were reversed. Sometimes a few short notes are added, but at Ithaca this was a rather rare occurrence. Elsewhere, as we shall see later, it is the usual thing. The first note is commonly omitted.

The call to the flock is a note seldom heard in the field, at least such has been my experience. I first learned of its existence when a small flock of Cowbirds flew over the cage in which I kept the two males referred to before. As they flew over, one of the males in the cage gave a call note somewhat like the flight call of the female (see below), but the notes or syllables were much more run together and different in quality from those of the female. This was frequently preceded by the ordinary whistle of the male, described above. This last fact is rather signficant.

A bird would not ordinarily give its call to a flock of its own kind unless it were going to fly up to them, or they were going to respond by coming to the caller. Therefore, it is to be expected that the flight call should be associated with this call note.

The feeding note of the male is the same as that of the female, a throaty *chuck,* which, in my experience, is seldom heard. However, most writers attribute this note to both sexes of this bird, so it may be given more frequently in other regions that at Ithaca. A common variation is *kuk.*

When a male first shows any signs of interest in a female he gives a short, clear *kek* or *tek,* quite different from the feeding note. This note, also, is seldom heard in the field.

The call-notes of the female are less numerous than those of the male, only two well marked notes being given. One of these, the feeding note is a guttural *chuck,* exactly like that of the male. The other, the flight rattle, is confined to the female. It seems to serve as a call to the males to follow the female. On numerous occasions I have watched a female leave a perch and give this call as she flew, and invariably one or more males would follow her. On the other hand, it has been my experience that whenever a female flew off without giving this call, no males would follow. With a very few exceptions, I have never seen a female follow a male, but it was always the female that led and the male that followed. This flight rattle is a rapid, rattling chatter, a sort of *chack, a chack a chack a chack a,* given very rapidly. In quality it bears a slight resemblance to the chatter of the House or English Sparrow, but is not as harsh. This note is enough to identify the female at a distance when to the eye it is almost impossible to say what the sex of the bird is. The only possible confusing note is the note of the male Cowbird when calling to a flock. This latter note is slightly lower and a good deal more run together than is the flight note of the female and is only rarely heard in the field. When no flock of Cowbirds is in sight, the flight rattle of the female is as good a "field character" as one can want.

Considerable geographic variation in the song and notes of the Cowbird has been found to exist. William Brewster, in Ritchie County, West Virginia (Ann. Lyc. Nat. Hist. N.Y., 1876, p. 141), writes that

> Although all its habits were quite familiar, some of its notes differed very much from any that I have heard in the north. One in particular, a hissing *z-z-zeep,* was quite unique, though apparently universal here.

Tyler (Auk, 1920, p. 584) writes as follows:

> ". . . . at Jamestown, Rhode Island, ... I frequently heard a male Cowbird . . . .

whistle in the following manner. He gave two long whistles, inflected upward, followed by three short, quick whistles on a lower pitch. His only variation was to omit one of the long whistles. This bird interested me not a little, for in Lexington, Massachusetts, ... I have noted a remarkable uniformity in its note. The Lexington bird gives one long whistle followed by two short ones—never more and never less. I should not have ventured to call attention to this Jamestown bird if the matter had not been brought to my memory by another Cowbird (presumably another one) at exactly the same spot in Jamestown. . . . . As I was passing the corner of the road where I had heard the bird four years before, a Cowbird uttered a long whistle, then two short ones, and concluded the series with another long whistle. This performance was not exactly the same, to be sure, ... yet it was similar to it, and, at the same time, very different from our Lexington birds. During the spring of 1919 I noticed repeatedly a similar extension in the whistling of another Cowbird, two or three miles away in Saunderstown, Rhode Island. . . . . Mr. L. A. Fuertes tells me that the notes of the Cowbirds in the lower Hudson Valley are quite different from those of the Ithaca birds."

Development of the Display

In the fall of 1922, several young males were captured from a large flock in the "Buffalo Enclosure" in the New York Zoölogical Park by Mr. L. S. Crandall, who very kindly sent me some, along with some young females taken from the same flock. I saw this flock in the park and there were no old birds in it;—about three hundred young birds, all in their postjuvenal molt. The chances were very fair that none of these young males had ever been in the company of old ones, and therefore that they had never seen the display nor heard the song of their species. They were put in an observation cage, and watched through the winter. The various stages in the development of the song and display were noted from time to time, and the series gives some interesting clues as to the probable evolution of the elaborate display of the adult male.

On October 8, 1922, one of the males gave a guttural, not very loud, *gkluh gkluh wheey,* which reminded me instantly of the true courting song, although different from it. The *wheey* was not whistled, but guttural like the first two syllables. The bird ruffled its feathers considerably during this performance, but did not arch its wings or bow at all.

On October 28, 1922, he tried to sing and gave the first few steps of the display, i.e., ruffled his body feathers, slightly arched his wings, and gave a very rusty squeak of two syllables, the first very short, the second longer.

On October 29, 1922, my notes read as follows: "Song—*gkluh gkluh ugh wheeey.* Fluffs out feathers and arches back of neck and wings slightly. Sometimes spreads tail fully and once extended its wings fully also. Occasionally makes a sound something like the breaking of twigs, calling to mind the true song of its relative, the Montezuma Cassique, *Gymnostinops montezuma.*"

November 9, 1922, "song—*kluk kluk tseeee.* The last note, much clearer than before, but still not as clear as the adult's squeak. Once in a while, instead of calling *kluk, kluk,* it gives a crackling sound, but less like that of *Gymnostinops montezuma* than a week ago." On this day it carried the display to the stage shown in fig. 4, Plate XVII. From this date on until the end of December comparatively little change was noted. It was not until January 1, 1923, that the males seemed to take any interest in the females. Until then they displayed to the air or the walls of the cage, but on that date it was noted for the first time that before displaying they would edge up closer to the females. The females appeared uninterested in the males and their antics. Shortly before this time, about the third week in December, the males were first seen to point their bills upwards when they came close to each other.

About the end of the first week in March, the song of the males was practically adult in every way, and by the end of the third week, their singing and displaying could not be told from that of a wild adult bird. As these males never saw or heard an old male in the process of courting, they could not possibly have learned by imitation. The whole thing must be a matter of instinct, and the song probably develops with the development of the syrinx from its natal to mature condition.

The Role of the Air-Sacs in Display

The curious motions performed in the display, associated with the production of song, are such as to make one suspect that possibly the air-sacs of the body are brought into play in the courtship antics of the Cowbird. After this suspicion had occured to me I found that it was by no means a new idea. Bicknell (Auk, 1885, pp. 152-154) writes that

> The singular bodily action which accompanies the vocal expression of the Cowbird conveys the suggestion that the air sacs of the body are brought into play in the production of song. The ducking of its head, the spasmodic motion of its tail, the half-opening of its wings, the swelling of its body, which collapse with the culminating notes; all this seems to point to the utilization of the air sacs—to their inflation and the muscular expulsion of the contained air in the execution of its singular vocal performance. . . . .

Artificial expulsion of the air from the air-sacs of a freshly killed bird results in a sound not unlike the *pseee* note.

Hudson (Birds of LaPlata, 1920, I, pp. 97-98) suspected the same thing in regard to the Screaming Cowbird, *Molothrus rufoaxillaris,* writing, "From its puffed out appearance and from the peculiar character of the sound it emits, I believe that, like the Pigeon and some other species, it has the faculty of filling its crop with air, to use it as a "chamber of resonance."

SEXUAL RELATIONS

No species has been accused of more varieties of sexual relationship. The Cowbird has been called monogamous, polyandrous, polygamous, and promiscuous by various writers, and not infrequently several of these terms have been used by the same author. The fact that there are more males than females has been thought of as a strong argument in favor of the idea that the Cowbird is polyandrous. In fact some theorizers have gone so far as to claim that the Cowbird is parasitic because it is polyandrous, although they had no definite proof of the actual existence of polyandry.

It is to be expected that the sexual relations of a species that is sadly awry in its cyclical instincts should be subject to considerable variation and easily modified. At Ithaca I have found that each male and each female has a definite territory (see under account of the territorial factor), and that there is a more or less definite pairing between the birds. My experience has been that if the birds are not really strictly monogamous, at least the tendency towards monogamy is very strong. My observations have been supported by those of Dr. Alexander Wetmore, of the Smithsonian Institution. He informs me that in Utah he had exceptionally favorable conditions for observing the sexual relations of the Cowbirds, and that in a relatively small area, (which was quite open and made observation of the birds an easy matter), he watched six pairs of Cowbirds, each pair having their own territory, and the birds remaining true to their mates. The male of pair A stayed with female A, and did not consort with any of the other five females.

However, during the breeding season Cowbirds are frequently found in small flocks. This is particularly true of the open prairies of the west, where the species reaches its greatest abundance. This calls for an explanation. This matter is also mentioned under the question of territory but a few words may be said here. It is a matter of common knowledge to all field naturalists that when one of a pair of birds is killed the surviving member finds a new mate in a surprisingly short time. This means that there must be a surplus of unmated birds on hand in every locality. In many species, these surplus individuals are to be found singly, and are consequently not noticeable. The Cowbird, on the other hand, is eminently a gregarious bird and their habits are such as would make them very conspicuous, feeding around cattle and near barns and houses. I have always found the breeding birds singly or in pairs, and furthermore, at Ithaca at least, these small bands are most commonly seen in places where there are few or no nests. It is my belief that many of these small flocks are composed of non-breeding birds which may represent the surplus individuals on hand in case any mated bird should need to be replaced. Two other factors also play a part in the formation of these small flocks. First, as we know from the migration of the bird, the immature birds arrive last, often after many of the adults have started to breed. Immature (year old) Cowbirds are not distinguishable from adults by plumage and so cannot readily be differentiated. I may say in passing that the average observer sees relatively few *breeding* Cowbirds because they are far less conspicuous than these bands of non-breeders. Because of this, observers all over the country having noted Cowbirds in small flocks all summer, quite naturally have come to believe that the Cowbird never pairs.

Shortly after the resident year-old birds have come, some of the early breeding adults finish breeding, forsake their territories, and gather into small flocks in places of abundant food supply or join already existing flocks. As the season wears on more and more of the adults finish their reproductive activities and form small bands.

Secondly, the breeding birds desert their territories for a part of the day in order to get food which may not be abundant in their respective areas. Howard has shown that often a species will pair off, each pair having their own territory on which they resent any intrusion of their own kind, and at the same time there may be a common neutral feeding ground, where they flock together peacefully. Early in the season, from the middle of April until the beginning of May, Cowbirds are to be found in their territories chiefly early in the morning, leaving them at about nine or ten o'clock, and foraging in small bands on the uplands during much of the day. As the other birds begin to nest the Cowbirds spend more and more time in their respective territories. Such has been my experience at Ithaca and there is no reason to believe that it does not hold true for other regions as well.

In the plains of the west it is quite probable that some breeding Cowbirds may remain in flocks all the time, although it has never been shown that these flocks so commonly reported are really composed of *breeding* birds. Several factors would tend to bring about such a state of affairs. In that region the Cowbird reaches its greatest abundance. Howard has sown that in a region where any species is exceptionally common the territorial factor is much less potent than in regions of lesser abundance. In this prairie district where forests and hills are absent, the available supply of nests is smaller, certainly in species and probably in individuals, than in places of more varied topography. These two factors, working together, tend towards the reduction of the territorial factor and doubtless have something to do with the fact that what are apparently breeding individuals occur in small flocks. In the case of these flocks in the west it is highly probable that the sexual relations of the birds are disturbed and that promiscuity must often result. Inasmuch as it would not be of any benefit to the Cowbird to become monagamous it certainly looks as though the state of promiscuity is secondarily acquired and that monogamy is the original condition.

As before stated, the males outnumber the females. This is probably true of most species but is very apparent in the Cowbird, although the sex ratio is not as unequal as some writers seem to believe. From my observations I would put it as about three males to two females. This may vary in different parts of the country, but it seems that many reports stating that the males vastly outnumber the females are certainly exaggerated. For one thing, the males are more conspicuous than the females and therefore observed more often.

Assuming that this ratio of three to two is approximately correct it would mean that for every two males that secure mates there is an extra unmated male. In many cases some of the males are killed and the extra ones take their places but frequently all the birds survive. In such cases does the extra male join an already mated pair and cause the semblance of polyandry, or if not, what does he do? On one occasion I knew of a case that certainly savored of polyandry. A pair with whose territory I was fairly familar was noted several times and each time there was just a single male and a single female. The male used to stay in his singing tree and so was easy to find. The female, when wanting her mate, would fly into the open and give her flight rattle. The male would quickly take off after her. One day it was noted that when the female called for her mate he came directly from his favorite perch as always but another male, new to the territory, also answered her summons. This interested me not a little and I went back there the next day and waited for the female to call for her mate. Again both males answered her summons, the original male coming as always from his singing tree and the new one from a tall tree near a railroad track. Some time later in the afternoon the original male was seen again in his singing tree and the second male was noted in the tree from which he had flown in answer to the call of the female. On the next two successive days this male was seen in or near this tree and it certainly looked as though he had established himself there. A week later the place was revisited and both males were found, each in his own tree and both again answered the summons of the female.

This apparently was a case of polyandry—an unmated male established himself in the territory of a mated pair. He was not there originally as the pair had been watched considerably before his advent. The original male seemed not to mind the presence of the other. However, no actual intercourse between any of the birds was observed.

While the Cowbird is monogamous, it is open to, or at least not protected from, the advent of polyandry. Although each male establishes a territory and certainly has a favorite singing tree, he seems to make almost

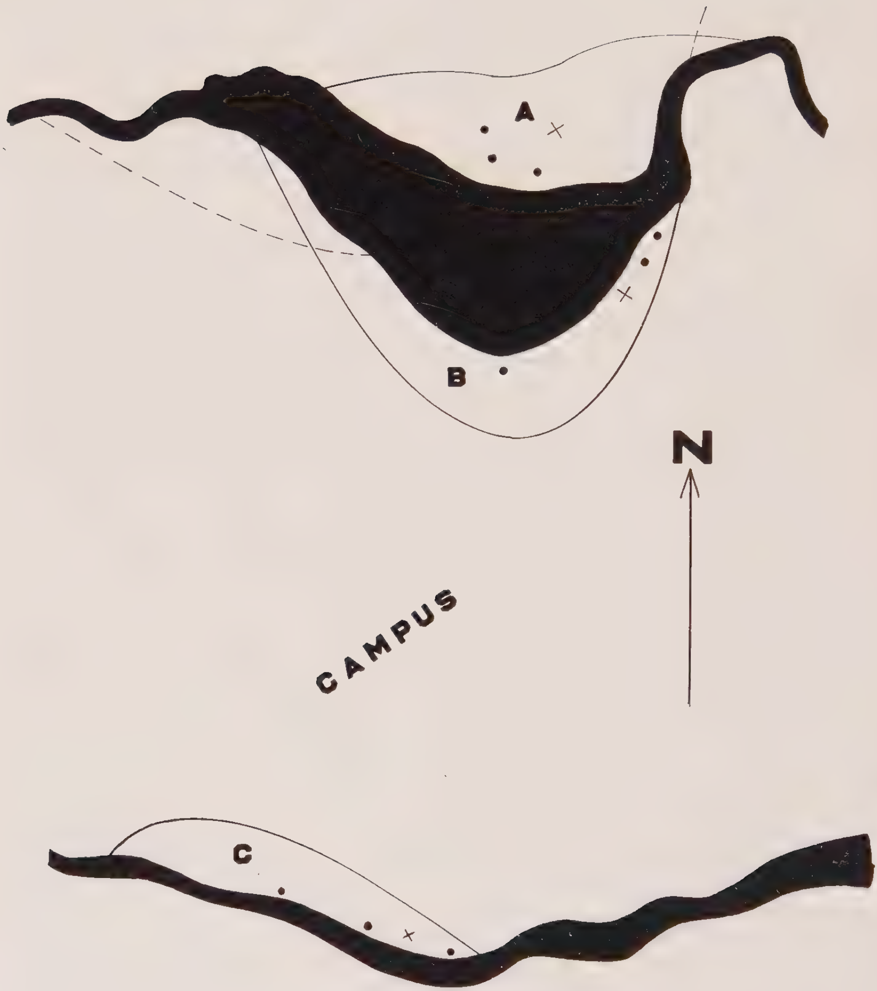


Fig. 8.
Breeding Territories of Molothrus ater.
A.—Territory of first pair.
B.—Territory of second pair.
C.—Territory of third pair.
In all three territories the singing tree of the male is indicated by an X and the nests victimized by large dots.

no defense of his area against the intrusion of other males. I know of no instance of two male Cowbirds fighting. They have what might be thought of as an intimidation display which may be sufficient to drive off newcomers. This consists of pointing the bill towards the zenith when near another male. The guarding or fighting instinct is absent in the male just as the guarding instincts of the female, i.e., nest-building and incubation, are wanting. It is just because the male does not guard his territory against other males that polyandry becomes possible. The preponderance of males over females makes the possibility greater and the fact that polyandry is not more frequent is more remarkable than are the cases of its occurrence.

Territory as a Factor in the Economy of the Cowbird

It has been shown that birds are restricted in their movements during the time when they have eggs or young in the nest. The boundaries beyond which a pair of birds does not forage at such a time are taken to the limits of the area of that particular pair. The nest is thought to be the central force which keeps the birds within these limits, but that this statement might well be modified is shown by the fact that birds which build no nests, that go so far in the loss of the nest-building instincts as to be parasitic on other species, also have well defined territories. Chance, and others, have shown, in the European Cuckoo, *Cuculus canorus,* that not only does each female (and each male) have a definite territory, but that what is almost surely the same female, returns year after year to the identical area. Howard recognized the fact that it was not the nest but the territory that is the fundamental, the original, the all-potent influence.

That the Cowbird also has its definite territories becomes very apparent to any one who has observed them for many consecutive days in the same region. Not only has the female a definitely marked-off breeding area, but the male has a definite post, entirely comparable to the "singing tree" that Mousley describes.

During the season of 1921 numerous individual male birds were seen daily on certain trees or on definite telegraph poles. From these perches they would sing and display; they might fly off but would soon circle around and come back. There was no question but that they were tied down to their respective singing trees. In one case the identity of the male was made certain because of a peculiar harshness of its song, and as this individual was to be found daily in the same tree, it seemed safe to assume that each day the same bird was seen at a given perch. Not only was a certain tree used by each male, but a certain part seemed to be preferred, usually the higher branches.

In the spring of 1922, when the first resident (see under Spring Migration) males arrived, several individuals went directly to some of last year's perches. The fact that each of these individuals went right to the old perch seemed to indicate that the same male returned each year to the same spot. When, by daily visits it was found that not only had each of these birds taken up its last year's position, but that each was to be seen almost constantly in the same place, this seemed to prove the matter. It might be possible for a new male, on arriving, to fly directly to a perch used by a male last year, but it certainly is not probable. And it surely is highly improbable that a new male would use exactly the same tree that was preferred by the last year's bird, and that he would stick to it so closely and persistently from the day of his arrival from the south.

That the female has a definite territory is not so easily noticed as she has no "singing tree," and is, as in most birds, less conspicuous and less often seen than the male. However, intensive observation soon familiarizes one with individual birds, so that the observer begins to feel before long whether it is the same bird that he finds daily in a certain area. Minute differences between individuals are noted; differences that almost defy analysis but that nevertheless offer a means of recognition. However, because of the very vagueness of these differences they are not an absolutely reliable guide, but they help when taken into account along with other bits of evidence. Long continued, intensive, consecutive daily observations soon determine whether there is always but a single female in any particular area. The areas are usually small enough to be able to do this with a fair degree of accuracy. Later in the season if one makes a special effort to find as many of the nests in any one territory as possible, and in this way locates most, if not all, of the Cowbird's eggs, the degree of similarity between them helps to indicate quite accurately whether or not they are all the produce of a single bird.

At Ithaca in the late spring and summer of 1921 I found that certain females (probably the same one in a given place each day) seemed to have certain definite territories. Just off the northeastern corner of the main quadrangle of the Cornell campus is a small body of water called Beebe Lake. One pair of Cowbirds stayed on the north shore of this lake, another pair on the south shore. I was sure that the birds I saw on the north shore were not the same as those of the south side because on several occasions I saw the pair on one side and simultaneously heard or saw the birds on the opposite shore. All the Cowbird eggs found in each territory were very similar to each other and uniformly different from those found in the other.

A third pair of Cowbirds established themselves along Cascadilla Creek, on the south border of the campus. The campus itself, stretching from Beebe Lake to Cascadilla Creek, consists chiefly of large lawns and the trees scattered about do not offer nesting sites to very many birds. This factor helped effectively to isolate the Cascadilla Cowbirds from those nearest them, i.e., on the south shore of Beebe Lake. These territories are shown in Text Fig. 8. The X indicates the singing tree of the male and the large dots, the nests used by the female.

All Cowbird territories studied were not quite as definite as these three. On the west shore of Cayuga Lake the Cowbirds were found to merge the extremities of their areas into neighboring ones, and, as shown elsewhere, there was at least one case of polyandry observed.

The position of the singing tree apparently bears no relation to the position of the nests victimized except in that it is usually near the highest point in the territory and from it can be seen most, if not all, of the area in which the affected nests are.

The size of the territories is very variable, some being a mile or more long and comparatively narrow, others, as the three in the map, much smaller. The smaller the territory the easier it is to work it, and for this reason small areas were chosen for study.

The Cowbirds do not make any very spirited attempts to defend their territories and consequently in regions of unusual abundance the territorial factor is much less noticeable. I have never seen Cowbirds fight and their method of defense is restricted to an intimidation display. This has been discussed before and need not be repeated here.

Eggs and Egg-Laying

About no point in the life history of the Cowbird is there a greater shroud of ignorance than that which surrounds its egg-laying habits. Inasmuch as the egg-laying habits are what make the bird parasitic, or, in other words, constitute its so-called parasitism, they form the center of the whole problem.

At the time this work was begun, the only facts definitely known were: 1, that in a great many cases but one Cowbird egg was found in a nest; 2, that not infrequently eggs of apparently two (or more rarely three) different Cowbirds were laid in the same nest; and 3, that in many cases two or more eggs of the same Cowbird were laid in the same nest. A very few writers claimed to have seen a female Cowbird on a nest of another species but had no notes other than seeing the bird on the nest. They did not know positively whether the bird was actually laying or not. On two occasions I have seen female Cowbirds get on old nests, settle in them as though they were going to lay and then fly off without laying. Both of these cases were seen a week before the Cowbirds started laying. It looked as though the birds were just getting interested in nests before their breeding time began.

Quite a number of authors would have us believe that the Cowbird usually deliberately punctures or removes some of the other eggs in a nest when depositing one of its own, but there is absolutely no conclusive *positive* proof for this idea, while the negative evidence is practically overwhelming. The number of eggs laid by a single bird in one season, and the intervals between them were absolutely unknown.

In order to determine definitely whether or not the Cowbird normally lays but a single egg in a nest, data on approximately nine thousand victimized nests of one hundred and ninety-five kinds of birds were assembled, and it was found that in over two-thirds of the cases only one parasitic egg was found in a nest. This shows pretty clearly that the normal, the usual, the characteristic thing is for a Cowbird to deposit one egg in a nest.

Nevertheless about a third of the nests held more than a single Cowbird's egg apiece. This is no inconsiderable number or percentage of exceptions to the above rule, and calls for an explanation. It has been shown that under normal conditions each pair of Cowbirds has a more or less definite territory and that the female tends to restrict herself to nests within that particular area. However, the cyclical instincts of the female are so aborted that she is probably quite easily induced temporarily to forsake her territory long enough to deposit an egg in a near-by nest. The sight of a pair of birds building across a stream, that may otherwise form the boundary of her territory, might be sufficient to shake the territorial instincts of the female long enough for her to make use of that nest. Again, in regions where the Cowbird is very common (and this applies to a great part of its range) territories are apt to overlap and in this way two Cowbirds may make use of the same nest. In this way I believe we can account for the fact that not infrequently eggs of two or more rarely even three different individuals are found in the same nest.

The finding of two or more eggs of the same individuals in any one nest may be explained on the assumption that no nest not already victimized was available on the day the second of the two eggs was laid. It may also be barely possible that another factor, hitherto unsuspected in the Cowbird, plays a part, namely a tendency towards specificity of hosts.

It is definitely known that the European Cuckoo, *Cuculus canorus,* is specific in its parasitism, i.e., each female tends to parasitize but a single species. Consequently we have Meadow-Pipit Cuckoos, Wagtail Cuckoos, Reed Warbler Cuckoos, etc., each parasitic on a certain, definite species of bird. The Cowbird is certainly not definitely specific in its parasitism, but nevertheless signs are not wanting to the effect that there may be a slight tendency towards specificity. This tendency is still in its very earliest stages and ordinarily is not noticeable, but a few cases will show how at times, it may crop up, and influence, to some extent at least, the actions of the birds involved.

The late J. A. Allen, in his report on the birds of the Dakota and Montana Territories, (Proc. Bost. Soc. Nat. Hist. 1874 pp. 58-59), writes as follows of the Lark Bunting, *Calamospiza bicolor.*

> "This species proves to be one of the favorite foster-parents of the Cowbird *(M. pecoris)*. In a series of eighteen nests, five or nearly one-third, contained eggs of the Cowbird, two even containing two each, and one had three; while out of twenty-nine nests of other ground-nesting prairie birds, collected at the same time, and over the same area, *not one* contained an egg of the Cowbird!"

The data given is not sufficiently exact as to the length of time and extent of area to enable one to say definitely that one or several Cowbirds seemed to prefer nests of the Lark Bunting to those of the other ground nesting birds. Admitting the possibility that nests of *Calamospiza* were more abundant and easier to find than those of other birds, still, the fact that not a single one out of the 29 nests of the other species contained an egg of the Cowbird, although the latter was a common bird there, and that nine of the parasitic eggs were found in nests of the bunting, is not entirely without significance.

Gœlitz, in Illinois, (Ool. 1916, p. 14) studying a little colony of 25 pairs of Red-winged Blackbirds, found eleven Cowbird eggs on June 19, and six on June 27. While the Red-wing is a fairly common victim of the Cowbird (see under Red-winged Blackbird, p. 212), still this is a most unusual percentage of parasitism, unequalled anywhere else for this bird. Other nesting birds are not locally scarce in that particular region and the only plausible explanation is that the few Cowbirds responsible for the eggs, (and there could not have been many individuals to such a small territory), showed a slight tendency towards specificity. Whether this specificity was conscious or volitional on the part of the birds or was the result of potent environmental conditions is a point on which we can say nothing definite.

J. P. Norris, (O. & O. 1890, p. 177-182) in reporting on some seventy sets of eggs of the Prothonotary Warbler in his collection gives some data of interest in this connection. Of thirty-five nests collected at Burlington, Iowa, between May 28 and June 10, 1888, no less than eighteen or a little more than half, contained eggs of the Cowbird, in one nest there being three and, in one case, even four of the parasitic eggs. Let us examine the data more closely—take a single week's collecting from June 2 to June 8, 1888.

On June 2, six nests were found, four of which were victimized.

On June 3, eleven nests were found, of which seven held Cowbirds' eggs.

On June 5, four nests were taken, one of which was parasitized.

On June 6, four nests, two of which were infested.

On June 8, five nests, with Cowbirds' eggs in two of them.

This data is all the more interetsing because of the fact that the Warblers nest in holes in trees. The Cowbird seems to prefer open nests built in the open. Although the holes were doubtless shallow, yet ordinarily we should not expect any such degree of parasitism. It seems quite likely that some Cowbirds at Burlington specialized on Prothonotary Warblers' nests.

In the Ithaca region, those individual Cowbirds which lay early in the season, i.e. from about the 25th of April until the second week of May, are practically restricted to nests of the Phœbe, as the latter is the only host species nesting in numbers that early in the season. In this case, we might say that the first Cowbirds to lay are more or less specific upon Phœbes, although it is quite evident that this preference, if it may so be termed, is one of necessity rather than real conscious choice. However, some such condition must doubtless have been the starting point from which has developed the curious specificity of the European Cuckoo. It is absurd to think of a Cuckoo as originally going around the countryside, inspecting various kinds of nests, making notes of the dietetics of the different species and then repairing to some favorite perch to cogitate upon its researches and finally deciding to limit itself to any one of them.

Whether the Cowbird will eventually become specific or not is a question that must be left for the future, but is a point worthy of attention as time goes on. At the present time, in the stage of development of the parasitic habit exhibited by the species today, the Cowbird is clearly not specific under ordinary circumstances.

Because of its practice of utilizing about as many nests as it lays eggs, the total number laid by any female in a season has never been known, and, until the territorial factor was discovered, seemed a mystery hopeless of solution. However, the knowledge that each female has a definite breeding territory, threw an encouraging beam of light on the subject and showed that it was possible by prolonged continuous, intensive observation to follow an individual bird through a season, and with an ordinary amount of luck (always a factor in field work) to determine the number of eggs laid, and the intervals between eggs.

Recalling for a minute some things already discussed, we may remember that in the spring and summer of 1921 it was found that certain females were almost always to be found in certain more or less restricted areas. Much study was given to these territories and their outlines or boundaries approximately determined. Many nests of various birds were located within several of these territories and it was noted that the Cowbird eggs found in one area were very similar, in fact so similar to each other, and constantly and uniformly different from those in the others, that they seemed doubtless the product of the same bird. All that spring, summer, and fall, and to some extent even during the winter, considerable time was spent in locating as many nests as possible in these three areas; the three chosen being well separated from each other. (Territory A—n. shore Beebe Lake; Terr. B—s. shore Beebe Lake; Terr. C—Cascadilla Creek.) The locations of all nests were noted and also the favorite perches of birds whose nests were not found. In this way I became familiar with every bit of ground in these areas and laid the foundation necessary for the next season's work.

In the spring and summer of 1922, knowing in advance the probable location of many of the nests, it was possible to find them either before they were finished or at least before any eggs were laid. In this way most of the nests were found, almost all of them before any eggs were laid, and many while they were still being built. Then, by making a round of all the nests twice each day, once in the morning, and once in the afternoon, it was possible to know to within a few hours when each Cowbird egg was laid. Of course all the nests were not found, but so large a proportion were discovered that the chances favored the Cowbird's using nests previously located. Luck was not favorable, and the Cowbirds in each of the three areas under observation used only nests that I had previously found and in each of the three cases the eggs were quite clearly the product of a single female, agreeing very closely with each other in size, shape, color, and markings, and differing from the eggs found in the other two territories in these respects. Because the Cowbirds were not specific and because it was impossible to control the nesting of all the birds, I was not able to force a Cowbird to use a certain definite nest on a given day, and in this way, be able to witness the actual laying, but the following facts were obtained.

1. All three of the females under close study laid their eggs at intervals of one day, and not several days as some writers have prophesied.

2. Two of the birds laid five eggs each and the other laid four. In one of the cases where five eggs were laid (Terr. A.), I found no more after the fifth one although a great deal of time was spent in this breeding area. It was just because no egg was found on the sixth day that I kept very close watch of the bird and its territory on that and the following day. On the day this individual laid its fifth egg the other "five-egg" bird, (B), laid its first. For four days thereafter this bird (B) laid an egg daily and no more were found for individual A. On the day Cowbird B laid its fifth egg a heavy storm broke out and for a month and a half thereafter it rained more or less violently every day. As fast as nests were found, they were destroyed or washed away by the heavy rains, and, of course, it became impossible to keep any check on the actions of the Cowbirds. Over a hundred nests were lost during this period, directly or indirectly due to the stormy weather.

Above it was stated that no eggs were found in the territory of Cowbird A after that bird had laid its fifth. Of course the mere fact that none were found is no indication that none were laid. However, the second of the "five-egg" birds (individual B), was collected three days after it had laid its fifth egg. Only five discharged egg follicles were found in its ovaries and the oldest of these follicles was still very prominent so that if any more eggs had been laid, follicles would have betrayed the fact. This shows pretty conclusively that only five eggs were laid in the case of this bird. This, together with the fact that bird A was known to lay at least five eggs and, judging by the four-day rest (?) after the laying of the fifth egg, probably did not lay any more, suggests the idea that five eggs may possibly represent what in other birds would be called a clutch although this is doubtful. We cannot be certain that Cowbird A laid only five eggs although I feel that I would have found at least one more egg in the four days between the fifth egg and the stormy season, if the bird had kept on laying.

At this point it is well to pause for a consideration of the value of the egg-follicles as a guide to the egg-laying activities of the bird. In a freshly discharged follicle the lumen is empty, while in a follicle several days old the epithelial lining disintegrates and gradually fills the entire lumen. By making histological sections of all the discharged follicles in an ovary we can tell the order in which they were discharged, or, in other words, the age in days of each one. The extent of distintegration of the epithelial lining is the chief guide in determining age. Of three females collected at random, i.e., birds not previously watched, one had four discharged follicles and two had three. One of these birds with three follicles had an egg ready to be laid in the lower end of the oviduct. and both of them had at least one ovarian egg considerably larger than the others.

From further study and observation of Cowbirds A and C, it seemed as though more eggs may have been laid, although on account of the devastating influence of the weather, none of the eggs were found. Frequently I went in the morning to inspect ten or fifteen nests that were still in good shape on the previous day only to find most of them washed away or turned over and the eggs carried off by some of the innumerable rivulets that closely dissected the ground. At any rate in both these territories the Cowbirds remained just as before, and observed the boundaries of their respective territories just as carefully as during the time when the eggs were being found daily. Usually birds leave their territories as soon as the work around the nest is done, i.e., as soon as the young can fly a little. The Cowbird's work is done when the last egg is laid; yet these individuals stuck to their places for over three weeks after the last recorded egg had been laid. Towards the last week the males sang less often and ceased displaying entirely. The birds became less and less noticeable and finally disappeared. For an ordinary observer who had not paid particular attention to the birds, it would have been impossible to state just when they left, so gradually did they become less and less conspicuous.

A record of the eggs laid by each bird and the nests used may be of some interest. Cowbird A laid its first egg on May 23 in the nest of a Chestnut-sided Warbler; its second egg, May 24, in a Veery's nest, its third, May 25, in another Veery's nest, its fourth, May 26, in a nest of a Redstart, and its fifth, May 27, in the same Redstart's nest.

Cowbird B laid its first egg May 27 in a nest of Redstart, its second egg May 28, in the same nest, its third, fourth, and fifth, on May 29, 30, 31 respectively, all in one nest of a Red-eyed Vireo.

Cowbird C laid its first egg May 22 in a Veery's nest, its second, May 23, in a nest of a Redstart, its third, May 24, in the same nest, and its fourth and last recorded egg, May 25, in a Red-eyed Vireo's nest.

From this it can be seen that these Cowbirds were not specific in their parasitism and there is no reason for supposing that they were any different in this respect from Cowbirds in general.

Of general interest in this connection is the following letter written by Mr. F. L. Rand, of St. Louis, Missouri, dated June 10, 1921, which I found in the files of the U.S. Biological Survey.

> I have for many years taken a special interest in learning about the Cowbird and its habits, etc. I have had many of the little fledglings in my care, both the males and the females, and have retained them during a winter or two, to learn some things that did not appear to be quite clear in reference to this bird.
>
> I have read how the Cowbird lays from four to five eggs; some bird writers have stated this; but the information I have obtained "at first hand," as it were, would make it appear otherwise; a little hen Cowbird that had its liberty at all times in a suite of rooms, was tempted by me to enjoy as nearly as possible its natural bent in the direction of egg laying and the results obtained in the way of information were somewhat surprising. Eight or ten last year's nests were placed around the room, with dummy (candy) eggs in them; each morning about six o'clock the little hen would seek some nest or other in which it would drop her egg, but not always in the same nest; oftentimes, the candy egg would be found on the floor; so, in fourteen successive days, the little hen laid thirteen eggs; this would indicate apparently that the destructive nature of the bird is even greater than it has been thought to be. . . . .

It is well known that some birds have a definite number of eggs to a clutch and cannot be stimulated experimentally to exceed the normal number. For example, pigeons, and doves (with a few exceptions) lay two eggs whereas English Sparrows lay from four to six in a clutch. In neither case can they be induced to lay more by removal of the eggs as laid, or by any other means so far known. In these birds the laying cycle may be said to be determinate, in the sense that the number of eggs in the clutch seems to be determined in advance. On the other hand, some birds such as the flicker, ducks, house wren, etc., will continue laying for an indefinite period much beyond the number normal for the species. In these birds the laying cycle seems to be indeterminate. Dr. L. J. Cole writes that, as a result of his studies of laying cycles in birds, he has come to the opinion that where the number of eggs in a clutch is small, not over five or six, the cycle is determinate. According to this the cycle in the Bay-winged Cowbird is probably determinate. It would seem likely that it might be advantageous to the parasitic cowbirds to have acquired an indeterminate laying cycle in place of the original determinate condition, inasmuch they would thereby be able to deposit a greater number of eggs than if the number in a particular laying period were definitely limited. It is possible that the parasitic species may be in a transition stage from a determinate to an indeterminate condition, and that some individuals may lay a larger number of eggs than others.*

Minot, probably influenced by the widespread but fallacious tale of the

* For this suggestion I am indebted to Dr. L. J. Cole.

Cuckoo, thought that the Cowbird laid its eggs on the ground and then carried them to the nest. This however, is absolutely untrue. On May 19, 1921, I found a nest of a Robin with four Robin's eggs in it. To quote from my field notes:

> As I had made considerable noise in tramping through the bushes I went back about twenty feet and hid in a clump of bushes, remaining still so that the birds might come back. I had been there but half a minute when a female Cowbird, that I had not noticed before, lit on the Robin's nest, looked around a little, and then settled on it. She shifted her position three times, a little bit each time and then settled down in the same way that a Robin does on the nest. She had been on the nest just a few seconds when one of the old Robins came back, saw her, and began yelling its distress call and drove her off. The other Robin, two Catbirds, three Yellow Warblers and one Blackpoll joined in the chase after the female Cowbird, each screaming its loudest, while the Cowbird flew off giving an excited series of chucks, a sort of *chuck a tuck a chuck a tuck* given fairly rapidly. While the birds were engaged in chasing her off I looked in the nest and saw, where there had been four Robin eggs before, the four Robin eggs and also one egg of the Cowbird.
>
> About a minute and a half after chasing the Cowbird from the nest, one of the Robins came back, looked in the nest, gave two syllables of its distress call and then drove its bill through the Cowbird egg, and, with a jerk of its head, threw the egg out. Unfortunately, it smashed beyond all use of collecting it. The Robin gave a few more syllables of its distress call, not as loudly as before, and then settled on the nest.
>
> Although there were two male Cowbirds in the near vicinity, neither of them showed up during the fracas and both were silent for about ten minutes after it was all over, when one of them was heard squeaking.
>
> This took place at about 7:30 A.M.

Howell describes the laying of a Cowbird's egg in a Red-eyed Vireo's nest (Auk, 1914, 250-251) as follows:

> May 30, 1909, I was lying partly hidden behind a log at Westerly, Rhode Island. . . . . A short time after taking up my position a female Cowbird . . . . came flying through the trees and lit but a short distance away. From time to time I glanced at her to see what she was up to but was unable to see that she had moved a muscle for some twenty minutes, for which time she remained hunched up as if asleep. Then she flew straight to the nest of a Red-eyed Vireo . . . . which, though but ten feet from my hiding place, was so well concealed that it had escaped my attention. After remaining on the nest about two minutes she flew out of sight among the trees. Upon investigation I found the nest to contain two eggs of the rightful owner and one of the Cowbird.

The Cowbird's wait in the tree and the direct flight to the nest reminds one greatly of Chance's observations on the European Cuckoo.

A much contested point in the egg-laying habits of the Cowbird is whether or not the parasite removes one of the rightful eggs when laying one of its own. In the case of the Robin's nest described above, no egg was removed, and no one has ever seen a Cowbird remove one. The circumstantial evidence is divided on this question. The most direct evidence is that given by Rand in the letter quoted above. He not infrequently found the candy eggs on the floor, very evidently removed from the nests by the female Cowbird. Hess (Auk, 1910, p. 26) says, "Have repeatedly found as many eggs belonging to the rightful owner lying on the ground under the nest as I have found Cowbird eggs in the nest. This has convinced me that every Cowbird egg deposited is at the expense of one songbird's egg. . . . ." My personal data on over a hundred parasitized nests watched show that in some cases Cowbirds may remove an egg. If a nest contains two eggs one day and two eggs plus one Cowbird egg the next it seems as though the third of the rightful eggs, that theoretically should have been laid, is missing and not that it was not laid. Several nests showed this state of affairs although quite a few had the third egg as well as the Cowbird's. In many cases, sets containing Cowbird eggs have as many fewer of the rightful eggs as there are Cowbird eggs in the nest. It is a question here as to whether some eggs were retained within the body of the foster species or if they were laid and removed by the Cowbirds when depositing their own. The latter is probably the case.

The question of puncturing eggs is a very different one. If Cowbirds were addicted to this habit we should expect that many nests would bear witness to it. On the contrary, the number of victimized nests containing punctured eggs is relatively insignificant. All the evidence is at best circumstantial and no one can say with certainty whether the holes are due to the Cowbird, to the owner, especially if frightened on the nest, or to Wrens or other visitors. It is possible, and not improbable that the holes may be due to the claws of the Cowbird. The Cowbird is usually too large for the nest it lays into and may have difficulty in placing itself and in getting settled may clumsily pierce one or more eggs with its claws. Inasmuch as its own egg is not yet laid, one could not surmise, that, because the parasitic egg alone is not pierced, the others were purposely done. Until all other possibilities are removed, no one explanation can be accepted, and in this case the evidence is none too good to start with.

The Cowbird lays its eggs in nests during the absence of the owners and usually in nests already containing eggs although quite commonly it uses nests still empty. Normally, Cowbirds do not lay in nests containing eggs in which incubation is well started, but a Cowbird has been known to lay an egg in a nest of an Indigo Bunting, containing young. This was a very exceptional case and was doubtless a last resort in an emergency. This case was recorded by Cordier (see p. 231).

The eggs of the Cowbird have never been thought of as mimicking those of the common victims as have those of some European and Oriental Cuckoos, and no adaptation is visible here. The eggs are of a very generalized type in size and coloration and closely resemble those of some other species such as the Song Sparrow, House Sparrow, and Yellow-breasted Chat. They are not noticeably small for the size of the bird as are those of some parasitic Cuckoos, in spite of what writers have claimed to the contrary. They vary considerably but not more than do Song Sparrow eggs. The largest Cowbird eggs I know of measure .99 x .65; .97 x .67; .93 x .72; .95 x .66, and the smallest excluding the Dwarf Cowbird, *M. ater obscurus,* .80 x .58; .80 x .61; and .76 x .63. The eggs of the Dwarf Cowbird are of course considerably smaller, in keeping with the relative size of the bird and average around .74 x .59.

In ground color the eggs vary from pure white to bluish white and the speckles from yellowish tan to dark brown. The spots and speckles are sometimes fine and uniformly distributed, sometimes coarse, and sometimes the large end of the egg is one large blot of brownish.

The Cowbird ordinarily finds the nests it victimizes by watching the birds build. Frequently I have noted Cowbirds perched almost motionless for an hour or so watching vireos, warblers, and sparrows carrying nesting material. As Howell (quoted above) described, the female when ready to lay flew to a perch overlooking the intended nest until the egg was just ready to be laid when she flew directly to the nest. There was no hesitancy in her actions, she apparently knew in advance the location of the nest.

The incubation period of the Cowbird is ten days, about the shortest of any of our passerine birds. Sometimes Red-wings' eggs hatch in ten days but more often it takes eleven or twelve. The short incubation period of the Cowbird is of course a very decided advantage to the bird, enabling it to hatch a day or more before any of the other eggs in the nest. The smaller eggs do not get quite as much heat from the body of the incubating bird as does the larger egg of the parasite, since the larger size of the latter egg tends to raise the bird's body from the others a little.

For the successful prosecution of a mode of reprodution such as parasitism implies it is obviously of great importance to the parasitic species to have a short incubation period as its egg may be laid in a nest after incubation has been started in the other eggs and yet must hatch as soon, if not sooner, than these others if the young parasite is to survive. (As a matter of fact in the majority of cases, irrespective of the species of bird victimized, the cowbirds' eggs hatch first.) Consequently when we find that with the perfection of the parasitic habit in the Cowbirds (from the primitive, non-parasitic *Agelaioides badius* to the relatively perfect *Molothrus ater*) there is a corresponding diminution of the period of incubation, or in other words, an acceleration of the embryonic growth-rate (amounting to about 20 per cent difference between *A. badius* and *M. ater*) it is difficult to interpret the case as other than adaptive. Shortness of incubation period could very easily have been of enough selective value for natural selection to operate on in a very decided fashion.

Lest it be thought that the differences in incubation period of the various species of cowbirds are due to differences in development at hatching time, it should be noted that all the species are alike in this respect.

Summary of the Egg-Laying Habit

1. The Cowbird, in the majority of cases, lays one egg in a nest.
2. The Cowbird sometimes lays more than one egg in a nest.
3. More than one Cowbird sometimes lay in the same nest.
4. The Cowbird sometimes lays in a nest before any of the rightful eggs are laid.
5. The Cowbird usually lays in nests already containing eggs.
6. The Cowbird lays its egg in a nest while the owner is away.
7. The Cowbird rarely lays an egg in a nest containing eggs already partly incubated but has been known to lay in a nest containing young.
8. The Cowbird lays directly into the nest.
9. The Cowbird lays at intervals of one day.
10. Two Cowbirds laid five eggs each, and one laid four.
11. The Cowbird is not normally specific in its parasitism, but this tendency seems to crop out at times.
12. The Cowbird's egg is usually larger than the eggs with which it is found.
13. The incubation period of the Cowbird is ten days.

The Victims of the Cowbird

As might be expected from its wide geographic range, the Cowbird has been found to deposit its eggs in the nests of a very large number of species. The present list is doubtless not final, as in the course of time other species will have to be added to it, but it includes every species known to me to have been affected. The last complete list was that given by Bendire in his admirable Life Histories of North American Birds published in 1895. He mentioned 91 species and subspecies of hosts for *Molothrus ater ater,* and if we include the victims of *Molothrus ater obscurus* listed in that work the total reaches 108. Since then countless observers have published innumerable notes on the finding of parasitized nests and many forms have been added to the roll call of the Cowbird's victims. The present list contains birds of 8 orders, 25 families, 103 genera, 158 species, and 195 species and subspecies. Of this number 1 order, the *Machrochires,* and one family of *Passeres,* the *Certhiidæ,* are restricted to the hypothetical list inasmuch as the records found are none too satisfactory. Two birds which have been recorded as victims of the Cowbird are entirely disregarded here because there is no doubt as to the records being erroneous. These two are the Stephen's Vireo and the Philadelphia Vireo. The former was recorded as a host of the Cowbird in San Miguel County, New Mexico, a place outside the known range of the Vireo (Auk, XV, 1898, p. 309). The Philadelphia Vireo was recorded by Young (Auk, XV, 1898, p. 191), but his description of the Vireo is rather ambiguous and the record was very seriously questioned by Brewster (Auk, XX, 1903, p. 370). Young defended his claim (Auk, XXI, 1904, p. 283), but Brewster seems to have had the better side of the argument. Horsbrugh (Ibis, 1918, p. 493) reported a nest of a Philadelphia Vireo in Alberta with a Cowbird's egg, but he did not see the Vireos at all. Furthermore he does not even list the Red-eyed Vireo in his annotated list in spite of the fact that this Vireo ought to be the common species in that locality.

Of the 195 forms included in the present list, the greater part are uncommon, rare, or even, in some cases, accidental victims, while the species most commonly affected, (and, for this reason, the ones important to our study), number not more than 80. In many cases species are included on the basis of single or only very few records, and of course, while reliable, are of no more consequence than are isolated rare faunal records. It is of far more importance to determine what apparently available species are not victimized than to try to add one or two more to the list of hosts.

This naturally raises the question as to what constitutes "availability". Many birds are clearly not suited for the Cowbird's purpose—this applies to all præcocial species and to practically all non-passerine birds, there being only nine non-passerine species in the list. Of these nine all are very uncommon or rare victims and none are well suited to the task of bringing up a young Cowbird. In fact none of them are positively known to have hatched out Cowbirds.

At the outset it may be well to state the chief requirements necessary for a bird to be suitable for the Cowbird. In order that it be suitable as a foster-parent of the young Cowbird (*any nest* is suitable for a Cowbird's egg) a bird should be, first and foremost, an altricial species. The reason for this is clear, and to further expostulate on it would be merely an "elaboration of the obvious." Second; it should lay eggs that are not very much larger, if any, than those of the Cowbird. If the eggs of the former were much larger than those of the latter, the parasitic eggs would have little chance of receiving enough heat from the body of the incubating bird to insure their hatching. Third; its manner of feeding the young should not depart to any marked degree from the normal method. The following examples will make my meaning clear. Practically all passerine birds feed in the following manner. On the approach to the nest of the old bird, the nestlings open their bills as wide as possible and the parent bird thrusts its bill into the throats of the young. The young Cowbird is like most passerine birds in that it opens wide its bill and expects the old bird to feed it in the usual way. Mrs. M. M. Nice writes me that the Mourning Dove, however, reverses the process for in that species the young thrust their bills into the throat of the parent. Obviously then, a young Cowbird and an adult Mourning Dove could hardly "make connections" in the feeding process, and this lack of harmony in the instinctive actions of the two species would in itself be sufficient to destroy to some extent the "availability" of the Dove.

The various swallows might possibly rear a young Cowbird as long as it is in the nest but probably not after it leaves it, because of the habit swallows have of teaching their young to catch food in the air. The parent swallow flies close to the young and drops the food it has been carrying. The young bird quickly learns to catch the food as it drops. It is very doubtful that a young Cowbird would be able to do this, and, because of this inability whatever "availability" swallows may offer is in a large measure destroyed.

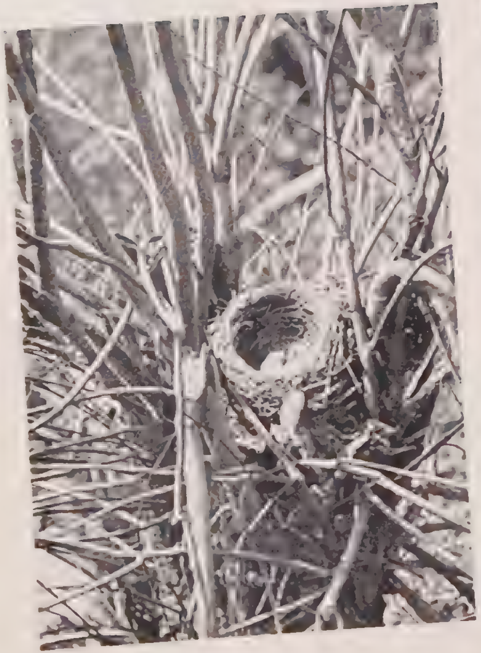
A fourth consideration is the nature of the food given the young. While it is true that Goldfinches have been known to raise young Cowbirds on seed pulp and I have seen a very small garter snake given a nestling Cowbird by a Robin, on the whole, the kinds of food a young Cowbird could thrive on are more or less restricted. One would hardly expect young Cowbirds to maintain themselves on a fish diet, for example. Consequently a Kingfisher or a Heron would probably fail as a fosterer for the Cowbird.

These are the chief conditions that must be met before a species can be truly available to the Cowbird. Occasionally Cowbird eggs are found in nests of unsuitable species, but these cases are comparatively uncommon. It is to be expected that such mistakes should occur once in a while, and the fact that they do occur in no way invalidates the potency of the requirements mentioned above. Other factors play a part in some cases. The most important of these is the temperament of the host species. For example the pugnacious character of the Kingbird is largely responsible for its comparative freedom from the Cowbird. In the case of the Shrikes absolute freedom from molothrine annoyance is due to the hawk-like habits of these birds. Another factor is the type of nest. Birds nesting in holes are, on the whole, free from the parasitism of the Cowbird. The only hole-nesting bird that is at all commonly victimized is the Prothonotary Warbler, and these Warblers generally nest in rather wide, shallow holes. Woodpeckers, House Wrens, Nuthatches, Chickadees, and Bluebirds are very seldom molested, in fact the Bluebird is the only one of these birds for which I have found more than a very few records. The Cowbird prefers open nests built in the open. As a rule birds of the forests are seldom molested but we have a very puzzling and striking exception in the case of the Oven-bird. This species is strictly a bird of the forest floor, builds a covered nest, and yet is very commonly parasitized. Birds nesting in swamps and marshes are fairly free from the Cowbird but in this case there seems to be more or less variation geographically. At Ithaca marsh nests are never parasitized, and this holds for many other localities, but on the other hand in parts of the Middle West the birds nesting in the sloughs of the prairies seem to be victimized to some extent. The Red-winged Blackbird illustrates just this sort of variation, being unmolested in the east and somewhat, or even fairly commonly, affected in the middle sections of the country. (See under Red-winged Blackbird.) The height above the ground at which a nest is situated seems to make little or no difference to the Cowbird. A nest may be on the ground or 80 feet above it and still be used.

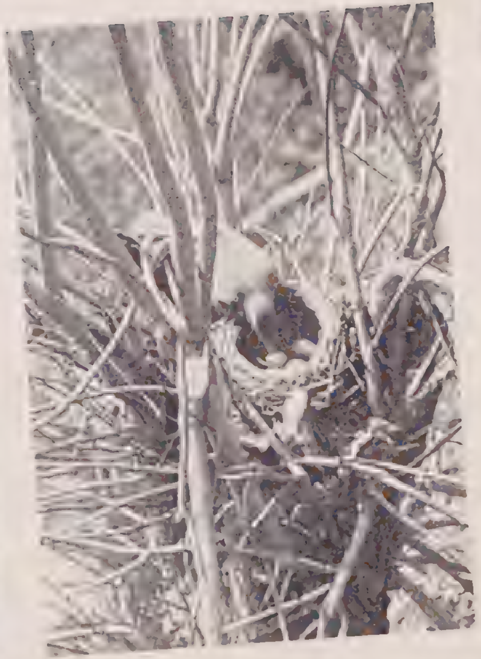
The only families of passerine birds breeding within the range of the Cowbird not yet known to be victimized are the Shrikes (Laniidæ), the Dippers (Cinclidæ, and the Wagtails (Motacillidæ). The Shrikes have already been discussed. The Dippers' range is altitudinally distinct from that of the Cowbird and so relieves us of their consideration. In the Wagtails, only one species, Sprague's Pipit, *Anthus spraguei,* breeds within the breeding range of the Cowbird. So few nests of the bird have been found that the absence of Cowbird records means nothing. In fact Mr. W. E. Saunders, of London, Ontario, in writing me of his experiences with

PLATE XIX.

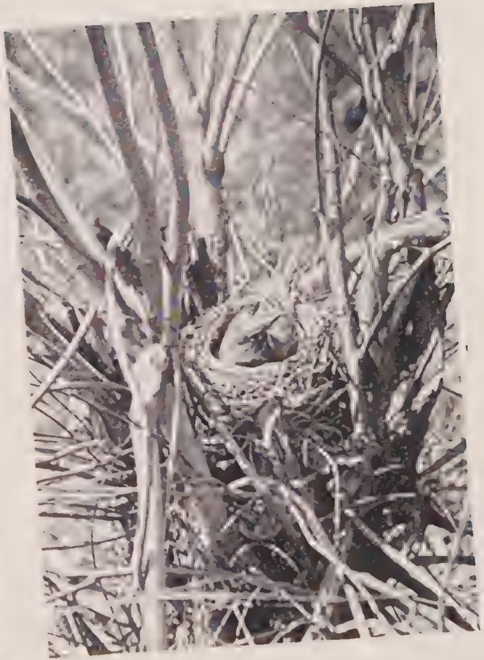
REACTION OF THE ROBIN TO EGGS OF THE COWBIRD.



Robin's nest with two eggs of the owner and one of the Cowbird.



Robin piercing Cowbird's egg before throwing it out.



Robin incubating its own eggs after disposing of the Cowbird's egg.

the Cowbird in Alberta says that he has never found a nest of Sprague's Pipit but judges that it is probably victimized by the Cowbird.

Among the other passerine families, all of which contain species known to act as hosts of the Cowbird, almost all the birds, many of whose nests have been found, are included in the list of victims. In this statement only birds building open nests built in the open are considered. Hole-nesters are naturally quite exempt from molothrine annoyance. Also excluded from our consideration are birds ecologically distinct in their breeding grounds from the Cowbird. Such are the Seaside and Sharp-tailed Sparrows of the salt marshes and possibly the Pine Siskin of coniferous forests. The outstanding exception is the Corvidæ or the family of Crows and Jays. Here the difference in size of the birds, and consequently of the eggs, is sufficient to explain their freedom from molestation.

Of the Sparrows, Vireos, and Warblers that have been rarely or uncommonly recorded as victims all are birds, relatively few of whose nests have ever been found. The House or English Sparrow is a striking exception, however, but its nests are usually in covered places and the nests are not open but are domed, more or less spherical in structure, and the majority in cities and such places where there are no Cowbirds.

In discussing the victims from the viewpoint of the Cowbird we should distinguish between those that rear the young Cowbirds and those that are on the list merely because Cowbirds' eggs have been found in their nests. Obviously only those species that serve as foster-parents of the young Cowbird are important in the economy of the parasite. Of the 195 birds on the list, 91 have been definitely recorded as rearing young Cowbirds. Of the remaining number, a large number doubtless could, and do, act in this capacity but are less commonly victimized and so have been less often recorded. Also in the case of the rarer species the eggs are more frequently collected by the observers and so any possible hatching is eliminated. There are some birds however that refuse to tolerate Cowbirds' eggs. The Robin, Catbird, and Yellow-breasted Chat are examples of absolutely intolerant species. Others such as the Yellow Warbler are intolerant to a certain extent.

Birds react to Cowbirds' eggs in several ways. The great majority of species seem not to mind the strange eggs in the least and accept, incubate, and hatch them. Of these birds, some occasionally cover over the parasitic eggs by building a new floor over them if they have no eggs of their own at the time. This is true of such birds as the Red-eyed, Warbling, Blue-headed and Yellow-throated Vireos, the Prothonotary, Yellow and Chestnut-sided Warblers and the Red-start. This has also been recorded in the following species—Meadowlark, White-crowned Sparrow, Cardinal and Indigo Bunting, but only a single time in each case.

Other birds throw out the foreign eggs. The Robin and Catbird are the exponents of this habit. Experiments were tried to see whether these two species could tell the difference between their own eggs and those of the Cowbird by color or size or both.

On May 10, 1921, a Robin's nest was found containing 2 eggs. I put in one egg of a Song Sparrow and another Robin's egg. On revisiting the nest ten minutes later I found the Robin on the nest. She flew off and exposed the contents of the nest. There were only the three Robin eggs present and no trace of the Song Sparrow egg was found. On May 11, the bird was sitting on the three Robin eggs and I put in a Chipping Sparrow's egg. An hour and a half later the bird was sitting on all four eggs. The next day, and the day after the Robin was seen sitting on all four eggs. On May 13 I moved the Chipping Sparrow's egg and put in a Song Sparrow's egg which the Robin threw out. I then put back the Chipping Sparrow egg and the Robin accepted it as before. On May 19 the Chippy's egg was still in the nest. Robin's eggs are plain blue and average about 1.1 x .8 inches; those of the Chipping Sparrow are bluish with a few blackish markings at the larger end, and measure .7 x .5 inches; and those of the Song Sparrow are whitish with numerous rufous-brown markings which sometimes nearly conceal the ground color, and average about .76 x .6 inches. Song Sparrow eggs are very similar to those of the Cowbird and were used in their place. Thus it will be seen that the Robin accepted the egg which resembled its own in color and rejected that which differed in this respect. Size seemed to be unimportant as a Chipping Sparrow's egg is even smaller than that of the Song Sparrow and yet was accepted while the latter was not. This was checked up by similar experiments on several other pairs of Robins and the results agreed in all cases. Cowbird eggs were used in some of the experiments with the same result. Plate XIX shows a Robin throwing out a Cowbird's egg from its nest.

Catbirds' eggs are greenish blue and considerably smaller than Robins. Cowbird eggs placed in a Catbird's nest were instantly ejected on the return of the Catbird to the nest. Chipping Sparrow eggs fared the same way. Of course the latter do not match the color of Catbird eggs as well as they do Robin eggs but the difference was not as great as it might seem. Catbirds seemed to tell both size and color, although the color tests were not very conclusive.

Many birds desert their nests if the Cowbird lays first. The Yellow-breasted Chat however deserts even if it has eggs of its own. This is all the more noteworthy because its eggs are almost identical with those of the Cowbird. Here the explanation is that the Chat is extremely wary and deserts on the least provocation. The Cowbird's egg is such a provocation although it is very doubtful if the Chat can tell the strange egg from its own. It can tell that its nest has been tampered with and that is cause enough to desert. (See under Yellow-breasted Chat, p. 249.)

The great majority of birds do not seem to mind the Cowbird's eggs if they have some of their own at the time. If anything, they act as though they are proud of the large egg and are as much concerned over its welfare as they are over their own.

The Yellow Warbler is a semi-intolerant species in that its intolerance is chiefly confined to eggs deposited before it has laid any of its own. For a fuller discussion see under Yellow Warbler in the annotated list (p. 241). The Warbler does not cover over the strange egg because it is a Cowbird's egg but merely as a foreign particle in the nest environment. Acorns are covered in exactly the same way.

On one occasion I placed a mounted female Cowbird near a nest with eggs of a Chestnut-sided Warbler and waited to see what the warbler would do. The female warbler soon came to the nest bush, flew around it excitedly a few times and then perched on a twig over the mounted Cowbird (about 10 inches above it), and just sat there staring at it for about five minutes hardly making any noise during this time. It seemed as though its previous antics would have been sufficient to drive off a live bird and the warbler appeared greatly puzzled over the visitor's immobility and general indifference to her actions. Then the warbler flew off and returned with her mate. The male did not come closer than six feet to the nest (possibly owing to my presence), and the female hopped around nervously in the bush for a minute, and then went to the nest, hesitated a second when she got there, and finally settled on the eggs, all the while suspiciously eyeing the Cowbird. Then I removed the Cowbird.

It seems that the Cowbird lays in a nest in the absence of the owner but most birds are so vigilant of their nests that often a laying Cowbird must be subject to considerable attack, or at least be the witness of many intimidation displays on the part of its victims. Chance's notes on the behavior of Meadow-Pipits towards a laying Cuckoo are of much interest in this connection and should be read by anyone interested. The Cuckoo seemed not to mind the Pipits and went about its business just as though no tormentors or would-be tormentors were present. I have seen a Robin drive a Cowbird from its (Robin's) nest, but most of the victims used are smaller than the parasite and do not have the Robin's advantage of superior size.

It is impossible to say definitely which species is affected most commonly as this varies greatly in different localities. A bird commonly parasitized in New York State may seem to a New Yorker as worthy of first place while an observer in Saskatchewan would feel that some species in his region is so frequently molested as to warrant its being granted this position. Although we cannot therefore say that any single species is the very commonest victim of the Cowbird, taking all the range of the latter into consideration, yet it is possible to take groups of species and treat them in this way for any locality.

The five birds most frequently parasitized by the Cowbird in New York State are the Red-eyed Vireo, Redstart, Yellow Warbler, Chipping Sparrow, and Song Sparrow. In the next group of five should be placed the Ovenbird, Maryland Yellowthroat, Towhee, Indigo Bunting, and Yellow-breasted Chat. This group is closely followed by the Warbling Vireo, Yellow-throated Vireo, Chestnut-sided Warbler, Phoebe, and Veery, while the Wood Thrush and Field Sparrow are next in frequency of being parasitized. At Ithaca the Redstart and Red-eyed Vireo were about tied for first place, followed in order by the Chipping Sparrow, Phœbe, Song Sparrow, Veery, Maryland Yellowthroat, and Louisiana Water Thrush.

Most of the victims of the Cowbird are contained in four families—the tyrant flycatchers, the finches, the vireos, and the warblers. Of the thirty-six species and subspecies of tyrant flycatchers in the North American fauna eleven are known to be parasitized, while of the remaining twenty-five, seven do not breed within the breeding range of the Cowbird. This family is relatively less important in the economy of the Cowbird than are the others mentioned above. The Cowbird is known to victimize sixty-two species and subspecies of finches. The total number of North American forms of this great family is one hundred and ninety-four, of which about a hundred are not known to breed within the range of the Cowbird. Yet the family is one of great importance to the parasite as some of its component species are very frequently victimized. The Cowbird is probably one of the chief factors in checking the increase of the smaller Sparrows and Finches.

The Vireos, while relatively few in species, are nevertheless a very important factor in the natural economy of the Cowbird, and the latter is undoubtedly the most serious single enemy of the birds of this family. No birds are more frequently affected, either absolutely or relatively, and none make less protest at the frequent impositions of the parasite. Of the twelve species of Vireos in the North American Check-List, nine are known to be victimized. Including subspecies, twelve of the twenty-five forms are included in the present list of victims. Of the remaining thirteen, five do not breed within the Cowbird's range and six others have ranges which only slightly coincide with that of *Molothrus.*

Of the fifty-four species of Warblers in the North American fauna thirty-six are known to be more or less imposed upon by the Cowbird, and, of the remaining eighteen, at least ten do not breed in any part of the Cowbird's range, or are, at most, so rare that the absence of records means nothing. The other eight are still little known and very few of their nests have been found. Including subspecies, forty-four, of the seventy-three kinds of Warblers, are included in the list of the victims of the Cowbird.

The members of this family are well adapted for the Cowbird's purpose and some of them are among the chief mainstays of the latter. They may nest on, or even in the ground, or eighty feet above it and still not be exempt from molothrine molestation. Important as many of these birds are in the ecology of the Cowbird, the latter is equally important in the natural economy of the Warblers. As in the case of the Vireos, the Warblers have no greater single menace to their welfare than the Cowbird. The extent to which the Cowbird affects these birds varies with the different species and, to some extent, geographically, within the species.

The other families are relatively less important but the following are worthy of comment.

Five species of Mockingbirds and Thrashers are known to be victimized by the Cowbird, all of them rarely imposed upon. With only one of the five has the Cowbird definitely been known to be successful. One almost always throws out the strange eggs from its nest, and the others are victimized so infrequently that little is known of their reactions. The Cowbird never becomes a serious menace to any of the members of this family and its eggs are not foisted upon any of the *Mimidæ* as a usual thing.

The Wrens are almost negligible factors in the ecology of the Cowbird, and the latter is of no great consequence in the life histories of these birds. Four of the fourteen species in the A.O.U. Check-List are known to be victimized by the Cowbird, all of them very infrequently. Counting subspecies, six, of the thirty-six in the North American fauna, are included in the roll-call of the Cowbird's victims.

The Paridæ are of little importance in the economy of the Cowbird, and the latter plays an inconsequential rôle in the lives of the Titmice. Five species of the eleven in the A.O.U. Check-List are recorded as victims of the Cowbird; all of them uncommonly.

The kinglets and gnatcatchers are, with one exception, infrequently molested by the Cowbird. They are interesting in that they are among the smallest birds definitely known to be affected by the parasite. Three of the six species in the North American fauna are included in the list of hosts: one of the three being represented by two geographic races.

The Thrushes are of considerable importance in the natural history of the Cowbird, and are among the largest birds commonly and regularly parasitized. Not only do we often find Cowbirds' eggs in the nests of some of these birds, but frequently they may be seen caring for young Cowbirds. Even here, where the rightful young are of approximately the same size as the young parasites, it is rather unusual to find any but the Cowbird surviving in a victimized nest. Of course birds the size of the Wood Thrush or the Veery have more of a chance of surviving than smaller birds such as Warblers and Vireos, and they do live through more often than do smaller species. Still in the great majority of cases the young Cowbird is the only one to leave the nest.

Seven of the fifteen North American species in this family are more or less imposed upon by the Cowbird, two of them being represented in the present list by two races each.

Before passing to the annotated list of the victims, it may be well to list them separately for each race of the Cowbird, as follows:

Molothrus ater ater

Oxyechus vociferus vociferus	Killdeer
Zenaidura macroura carolinensis	Mourning Dove
Zenaidura macroura marginella	Western Mourning Dove
Coccyzus americanus americanus	Yellow-billed Cuckoo
Melanerpes erythrocephalus erythrocephalus	Red-headed Woodpecker
Tyrannus tyrannus	Kingbird
Sayornis phoebe	Phoebe
Myiochanes virens	Wood Pewee
Empidonax virescens	Acadian Flycatcher
Empidonax traillii brewsterii	Traill's Flycatcher
Empidonax traillii traillii	Alder Flycatcher
Empidonax minimus	Least Flycatcher
Otocoris alpestris praticola	Prairie Horned Lark

Cyanocitta cristata bromia	Northeastern Blue Jay
Dolichonyx oryzivorus	Bobolink
Xanthocephalus xanthocephalus	Yellow-headed Blackbird
Agelaius phoeniceus predatorius	Red-winged Blackbird
Agelaius phoeniceus neutralis	San Diego Red-wing
Sturnella magna magna	Meadowlark
Icterus spurius	Orchard Oriole
Icterus galbula	Baltimore Oriole
Icterus bullockii	Bullock's Oriole
Quiscalus quiscula aeneus	Bronzed Grackle
Carpodacus mexicanus frontalis	House Finch
Carpodacus purpureus purpureus	Purple Finch
Passer domesticus domesticus	House Sparrow
Astragalinus tristis tristis	Goldfinch
Pooecetes gramineus gramineus	Vesper Sparrow
Passerculus sandwichensis savanna	Savannah Sparrow
Ammodramus savannarum australis	Grasshopper Sparrow
Passerherbulus henslowii sussurans	Henslow's Sparrow
Chondestes grammacus grammacus	Lark Sparrow
Zonotrichia leucophrys leucophrys	White-crowned Sparrow
Zonotrichia albicollis	White-throated Sparrow
Spizella passerina passerina	Chipping Sparrow
Spizella pusilla pusilla	Field Sparrow
Junco hyemalis hyemalis	Slate-colored Junco
Peucaea aestivalis bachmani	Bachman's Sparrow
Melospiza melodia melodia	Song Sparrow
Melospiza georgiana	Swamp Sparrow
Pipilo erythrophthalmus erythrophthalmus	Towhee
Richmondena cardinalis cardinalis	Cardinal
Hedymeles ludovicianus	Rose-breasted Grosbeak
Guiraca caerulea caerulea	Blue Grosbeak
Passerina cyanea	Indigo Bunting
Passerina ciris	Painted Bunting
Spiza americana	Dickcissel
Piranga olivacea	Scarlet Tanager
Piranga rubra rubra	Summer Tanager
Petrochelidon albifrons albifrons	Cliff Swallow
Hirundo rustica erythrogastris	Barn Swallow
Iridoprocne bicolor	Tree Swallow

Riparia riparia riparia	Bank Swallow
Bombycilla cedrorum	Cedar Waxwing
Vireosylva olivacea	Red-eyed Vireo
Vireosylva gilva gilva	Warbling Vireo
Vireosylva gilva swainsonii	Western Warbling Vireo
Lanivireo flavifrons	Yellow-throated Vireo
Lanivireo solitarius solitarius	Blue-headed Vireo
Vireo atricapillus	Black-capped Vireo
Vireo griseus griseus	White-eyed Vireo
Vireo bellii bellii	Bell's Vireo
Mniotilta varia	Black and White Warbler
Protonotaria citrea	Prothonotary Warbler
Limnothlypis swainsonii	Swainson's Warbler
Helmitheros vermivorus	Worm-eating Warbler
Vermivora pinus	Blue-winged Warbler
Vermivora chrysoptera	Golden-winged Warbler
Vermivora ruficapilla ruficapilla	Nashville Warbler
Vermivora peregrina	Tennessee Warbler
Compsothlypis americana americana	Parula Warbler
Compsothlypsis americana pusilla	Northern Parula Warbler
Dendroica aestiva aestiva	Yellow Warbler
Dendroica caerulescens caerulescens	Black-thr. Blue Warbler
Dendroica coronata coronata	Myrtle Warbler
Dendroica magnolia	Magnolia Warbler
Dendroica cerulea	Cerulean Warbler
Dendroica pensylvanica	Chestnut-sided Warbler
Dendroica fusca	Blackburnian Warbler
Dendroica dominica albilora	Sycamore Warbler
Dendroica virens	Black throated Green Warbler
Dendroica kirtlandii	Kirtland's Warbler
Dendroica vigorsii vigorsii	Pine Warbler
Dendroica palmarum hypochrysea	Yellow Palm Warbler
Dendroica discolor	Prairie Warbler
Seiurus aurocapillus	Oven-bird
Seiurus noveboracensis noveboracensis	Water-Thrush
Seiurus noveboracensis notabilis	Grinnell's Water-Thrush
Seiurus motacilla	Louisiana Water-Thrush
Oporornis formosus	Kentucky Warbler
Oporornis philadelphia	Mourning Warbler
Geothlypis trichas trichas	Maryland Yellowthroat

Icteria virens virens	Yellow-breasted Chat
Wilsonia citrina	Hooded Warbler
Wilsonia canadensis	Canada Warbler
Septophaga ruticilla	Redstart
Mimus polyglottos polyglottos	Mockingbird
Mimus polyglottos leucopterus	Western Mockingbird
Dumetella carolinensis	Catbird
Toxostoma rufum	Brown Thrasher
Thryothorus ludovicianus ludovicianus	Carolina Wren
Thryomanes bewickii bewickii	Bewick's Wren
Troglodytes aedon aedon	House Wren
Sitta carolinensis cookei	White-breasted Nuthatch
Baeolophus bicolor	Tufted Titmouse
Penthestes atricapillus atricapillus	Chickadee
Regulus calendula calendula	Ruby-crowned Kinglet
Polioptila caerulea caerulea	Blue-gray Gnatcatcher
Hylocichla mustelina	Wood Thrush
Hylocichla fuscescens fuscescens	Veery
Hylocichla ustulata swainsoni	Olive-backed Thrush
Hylocichla guttata faxoni	Hermit Thrush
Turdus migratorius migratorius	Robin
Sialia sialis sialis	Bluebird

Hypothetical

Archilochus colubris	Ruby-throated Hummingbird
Passerherbulus nelsoni nelsoni	Nelson's Sparrow
Certhia familiaris americana	Brown Creeper

Molothrus ater artemisiæ

Larus californicus	California Gull
Archibuteo ferrugineus	Ferruginous Rough-legged Hawk
Tyrannus verticalis	Arkansas Kingbird
Empidonax minimus	Least Flycatcher
Otocoris alpestris leucolaema	Desert Horned Lark
Xanthocephalus xanthocephalus	Yellow-headed Blackbird
Agelaius phoeniceus fortis	Thick-billed Red-wing
Sturnella neglecta	Western Meadowlark
Euphagus cyanocephalus cyanocephalus	Brewer's Blackbird
Quiscalus quisclua aeneus	Bronzed Grackle
Astragalinus tristis tristis	Goldfinch
Calcarius ornatus	Chestnut-collared Longspur

Rhyncophanes mccownii	McCown's Longspur
Pooecetes gramineus confinis	Western Vesper Sparrow
Passerculus sandwichensis alaudinus	Western Savannah Sparrow
Ammodramus bairdii	Baird's Sparrow
Ammodramus savannarum bimaculatus	Western Grasshopper Sparrow
Passerherbulus leconteii	Leconte's Sparrow
Chondestes grammacus strigatus	Western Lark Sparrow
Zonotrichia leucophrys leucophrys	White-crowned Sparrow
Spizella passerina passerina	Chipping Sparrow
Spizella passerina arizonae	Western Chipping Sparrow
Spizella pallida	Clay-colored Sparrow
Spizella breweri	Brewer's Sparrow
Amphispiza nevadensis nevadensis	Sage Sparrow
Melospiza melodia melodia	Song Sparrow
Melospiza melodia fallax	Mountain Song Sparrow
Melospiza melodia juddi	Dakota Song Sparrow
Melospiza lincolnii lincolnii	Lincoln's Sparrow
Melospiza georgiana	Swamp Sparrow
Passerella iliaca schistacea	Slate-colored Fox Sparrow
Pipilo maculatus arcticus	Arctic Towhee
Pipilo maculatus montanus	Spurred Towhee
Oberholseria chlorura	Green-tailed Towhee
Hedymeles ludovicianus	Rose-breasted Grosbeak
Hedymeles melanocephalus papago	Black-headed Grosbeak
Passerina amoena	Lazuli Bunting
Calamospiza melanocorys	Lark Bunting
Bombycilla cedrorum	Cedar Waxwing
Dendroica aestiva aestiva	Yellow Warbler
Oporornis tolmiei	Macgillivray's Warbler
Geothlypis trichas occidentalis	Western Yellowthroat
Icteria virens longicauda	Long-tailed Chat
Dumetella carolinensis	Catbird
Toxostoma rufum	Brown Thrasher
Salpinctes obsoletus obsoletus	Rock Wren
Troglodytes aedon parkmanii	Western House Wren
Polioptila caerulea obscura	Western Gnatcatcher
Hylocichla fuscescens salicicola	Willow Thrush
Hylocichla ustulata swainsoni	Olive-backed Thrush
Hylocichla guttata auduboni	Audubon's Hermit Thrush
Turdus migratorius migratorius	Robin

Hypothetical

Vireosylva olivacea	Red-eyed Vireo

Molothrus ater obscurus

Chœmepelia passerina pallescens	Mexican Ground Dove
Muscivora forficata	Scissor-tailed Flycatcher
Myiochanes richardsonii richardsonii	Western Wood Pewee
Empidonax traillii brewsterii	Traill's Flycatcher
Pyrocephalus rubinus mexicanus	Vermillion Flycatcher
Agelaius phoeniceus megapotamus	Rio Grande Red-wing
Icterus melanocephalus auduboni	Audubon Oriole
Icterus cucullatus sennetti	Sennett's Oriole
Icterus cucullatus nelsoni	Arizona Hooded Oriole
Icterus spurius	Orchard Oriole
Icterus bullockii	Bullock's Oriole
Astragalinus tristis salicamans	Willow Goldfinch
Pooecetes gramineus confinis	Western Vesper Sparrow
Chondestes grammacus strigatus	Western Lark Sparrow
Spizella atrogularis	Black-chinned Sparrow
Amphispiza bilineata bilineata	Black-throated Sparrow
Amphispiza billineata deserticola	Desert Sparrow
Peucaea cassinii	Cassin's Sparrow
Aimophila carpalis	Rufous-winged Sparrow
Melospiza melodia saltonis	Desert Song Sparrow
Melospiza melodia cooperi	San Diego Song Sparrow
Arremonops rufivirgatus	Texas Sparrow
Pipilo maculatus megalonyx	San Diego Towhee
Pipilo aberti	Abert's Towhee
Richmondena cardinalis cardinalis	Cardinal
Richmondena cardinalis canicaudus	Gray-tailed Cardinal
Guiraca caerulea caerulea	Blue Grosbeak
Guiraca caerulea lazula	Western Blue Grosbeak
Passerina amœna	Lazuli Bunting
Passerina ciris	Painted Bunting
Sporophila morelleti sharpei	Sharpe's Seedeater
Spiza americana	Dickcissel
Piranga rubra rubra	Summer Tanager
Piranga rubra cooperi	Cooper's Tanager
Phainopepla nitens	Phainopepla
Vireosylva flavoviridis	Yellow-green Vireo

Vireo atricapillus	Black-capped Vireo
Vireo griseus griseus	White-eyed Vireo
Vireo griseus micrus	Small White-eyed Vireo
Vireo huttoni huttoni	Hutton's Vireo
Vireo bellii bellii	Bell's Vireo
Vireo bellii pusillus	Least Vireo
Vermivora luciæ	Lucy's Warbler
Dendroica æstiva sonorana	Sonora Yellow Warbler
Dendroica aestiva brewsteri	California Yellow Warbler
Dendroica chrysoparia	Golden-cheeked Warbler
Geothlypis trichas scirpicola	Pacific Yellow-throat
Icteria virens virens	Yellow-breasted Chat
Icteria virens longicauda	Long-tailed Chat
Wilsonia pusilla chryseola	Golden Pileolated Warbler
Mimus polyglottos leucopterus	Western Mockingbird
Toxostoma longirostre sennetti	Sennett's Thrasher
Toxostoma curvirostre	Curve-billed Thrasher
Thryotherus ludovicianus ludovicianus	Carolina Wren
Thryomanes bewickii cryptus	Texas Bewick's Wren
Baeolophus atricristatus sennetti	Sennett's Titmouse
Psaltriparus minimus californicus	California Bush-Tit
Auriparus flaviceps flaviceps	Verdin
Polioptila caerulea caerulea	Blue-gray Gnatcatcher
Polioptila caerulea obscura	Western Gnatcatcher
Polioptila plumbea	Plumbeous Gnatcatcher
Hylocichla mustelina	Wood Thrush
Hylocichla ustulata ustulata	Russet-backed Thrush
Sialia mexicana bairdi	Chestnut-backed Bluebird
Sialia sialis sialis	Bluebird

In writing the annotated list I have felt that the species, and not the subspecies, should be used as the basis of discussion. Parasitism is a biological phenomenon rather than a taxonomic problem and species are the units in biology. However, in order that the list be of the greatest possible service to the widest circle of workers, all records have been carefully gone over, and wherever possible, the subspecies determined, not only of the parasite, but also of the victim and the detailed accounts are given for each race rather than for each species. In this way it is hoped that the data is rendered more usuable and the knowledge made more exact and definite. Subspecific determination have been based entirely on locality since eggs are not good criteria and the great majority of collectors cannot distinguish subspecific differences in the birds in the field. For assistance in these determinations I am greatly indebted to Dr. H. C. Oberholser who very kindly went over this part of my manuscript with me. The nomenclature has been brought up to date, but in order to avoid misunderstanding and confusion, the name given each species and subspecies in the last (1910) A.O.U. Check-List is appended as a synonym in all cases where the name used here is different.

The task of assembling, rejecting or accepting, and summarizing this data has been a tedious one, but it is hoped that the results may prove to be useful not only in connection with the study of the Cowbird but also as a small contribution to the life-histories of the 195 victims.

Annotated List

Larus californicus (Lawrence). California Gull.

An extremely unusual and accidental victim. I have but one record. Mr. Alfred Eastgate writes me that in June, 1899, he found a nest of this bird containing one egg of a Cowbird in addition to some of its own. This was in what is now the National Bird Reserve of Shrimp Lake. The Cowbird in this case is the subspecies *artemisiæ.*

Oxyechus vociferus vociferus (Linn.). Killdeer.
Oxyechus vociferus (A.O.U., 1910, p. 128).

An extremely rare and unusual victim. Dr. Oberholser, in his manuscript on the birds of Texas, lists this species as a victim of the Cowbird. The date and locality of this record are unknown to me, but the Cowbird in question is (according to Dr. Oberholser's list) the typical form, *M. ater ater.* This constitutes all the data I have on this species.

Zenaidura macroura (Linn.).

Two races of this bird are victims of the Cowbird.

a. *Zenaidura macroura carolinensis* (Linn.). Mourning Dove.

This bird is a decidedly uncommon victim of the Cowbird, and is interesting from our point of view in that it is one of the largest birds known to have been parasitized, exclusively of purely accidental cases. I have had no personal experience with this species as a molothrine host and published notes are few. The best account is by C. D. Kellogg (Bird Lore, II, 1900, p. 121), which is quoted below.

"On May 25, 1899, at Rock Hill, Pennsylvania, I found fifteen or more Doves' nests in one orchard. While looking for a suitable place in which to put my camera, I noticed a Cowbird flutter off a large Grackle's nest, and on examination found the nest to contain only a Cowbird's egg. Three days later I discovered that a Dove had deposited two eggs in this nest. Circumstances now prevented me from visiting the nest for three weeks when I found a Cowbird ready to fly.

"Although I watched the nest for some time to see how the Doves would feed the young Cowbird, they did not return, and I regret to say I did not succeed in learning the outcome of this interesting case."

This account is accompanied by a photograph of the nest, young Cowbird, and two Dove's eggs. For several reasons I am inclined to doubt the supposition that the young Cowbird was really reared by Mourning Doves. In the first place the Doves were not seen with the young strangeling. Secondly Grackles might have taken over the nest (as the Doves did originally), and might have hatched and reared the young Cowbird. Thirdly, as shown elsewhere (p. 190), it would be theoretically almost impossible for a Dove to raise a Cowbird on account of the peculiar method of feeding used by the former, and also because of the nature of the food.

Coues (Auk, 1884, p. 293) records a Cowbird's egg in a nest of a Mourning Dove, and this bird is listed as a molothrine victim by several writers; such as Bendire, Davie, and Watkins.

b. *Zenaidura macroura marginella* (Woodhouse). Western Mourning Dove.

Not in A.O.U. 1910 Check-List.

This race of the Mourning Dove is listed by Dr. Oberholser as a victim of the typical form of the Cowbird, *M. ater ater.*

Chœmepelia passerina pallescens (Baird). Mexican Ground Dove.

A rare victim of the Dwarf Cowbird.

On May 23, 1924, at Brownsville, Texas, I found a nest of this dove in an *Opuntia* cactus and it contained one egg of *Molothrus ater obscurus* in addition to the usual two eggs of the owner. Out of a dozen nests found this was the only one parasitized. Mr. R. D. Camp tells me that he once found a Cowbird's egg in a Mexican Ground Dove's nest in the same district.

Archibuteo ferrugineus (Lichtenstein). Ferruginous Rough-legged Hawk.

A purely accidental host of the Nevada Cowbird, *M. ater artemisiæ.* Mr. Alfred Eastgate writes me that on May 3, 1894, he took a set of four eggs of this hawk with one egg of the Cowbird in the nest, near Bottineau, North Dakota.

Coccyzus americanus americanus (Linn.). Yellow-billed Cuckoo.

Apparently an extremely rare victim of the Cowbird. It is given in Bendire's list, but aside from this I know of no data on it. The collection of eggs in the U. S. National Museum, at Washington, contains no set of this species with a Cowbird's egg, nor any record of one. As Bendire's collection rests in the National Museum, it is probable that he got his record from a correspondent.

Melanerpes erythrocephalus erythrocephalus (Linn.). Red-headed Woodpecker.
Melanerpes erythrocephalus (A.O.U., 1910, p. 192).

A very uncommon victim of the Cowbird. It is mentioned in the lists of Bendire and Davie, but no data is given. Professor Lynds Jones of Oberlin College writes me that he has taken the egg of a Cowbird from the nest of a Red-headed Woodpecker in Ohio.

Archilochus colubris (Linn.). Ruby-throated Hummingbird.

Surely a Hummingbird's nest would be the last place on earth one would expect to find a Cowbird's egg and the single published record is by no means too well authenticated. In the Ornithologist and Oologist, vol. XVI, no. 7, July, 1891, p. 109, there is an unsigned editorial paragraph to this effect:

"Walter H. Buss called a few days since and reported that M. S. Culver, of Medford, Massachusetts, in July, 1890, found the nest of a Ruby-thr. Hummer, located about ten feet from the ground. Upon securing, found it contained one egg of the Cowbird which completely filled it. This is an addition to the list of tenements occupied."

It should be borne in mind that this is third-hand information with a year's time in which to work up a good imagination elapsing between finding the nest and reporting it, and that the men in question are not well known ornithologists. I have included it here for completeness' sake, and feel that if there were any nest found, it was probably that of a Wood Pewee.

Muscivora forficata (Gmel.). Scissor-tailed Flycatcher.

Simmons (Birds of the Austin Region, 1925, p. 172) lists this bird as a victim of the Dwarf Cowbird. I have heard of no other data. It is rather puzzling that this bird should be so little molested by *M. ater* while in Argentina the *Muscivora tyrannus* is frequently victimized by *Molothrus bonariensis.*

Tyrannus tyrannus (Linn.). Kingbird.

The Kingbird is a very uncommon victim of the Cowbird, there being only a very few actual cases on record, although several writers have listed it, probably all based on the same published instances.

W. H. Gregg reports seeing a Kingbird feeding a young Cowbird along with its own brood in Chemung County, New York. It is certainly only very rarely that any of the rightful young survive with a Cowbird, and this either casts a doubt on this record, or adds new interest to it. Jensen found a nest of this species near Wahpeton, North Dakota, with three eggs of its own and two of the Cowbird. R. M. Anderson, in Iowa, writes that the Kingbird was the only species that "objected" to the Cowbird, but does not say exactly what he means by "objected." Coues writes of a two-storied nest of a Kingbird with a Cowbird's egg buried in the basement and two of its own on top. Kells, in the Auk for 1895, p. 106, claims to have found young Cowbirds in nests of Kingbirds.

Knowing the pugnacious disposition of this species, one is not surprised that the Cowbird leaves it alone, or at most, only rarely foists its eggs upon it.

Tyrannus verticalis (Say). Arkansas Kingbird.

A very rare victim. I have no definite records, but Dr. Oberholser lists this bird as a victim of the Nevada or Sage-Brush Cowbird, *M. ater artemisiæ.*

Sayornis phœbe (Latham). Phœbe.

This familiar bird of the wayside is one of the very commonest foster-parents of the young Cowbird. In regions where both species are common, fully 75 per cent of the nests contain eggs of both kinds. At Ithaca, out of some twenty-two nests, no fewer than sixteen were parasitized, in some cases as many as three Cowbird eggs being laid in the same nest. The first Cowbird eggs of the season are usually found in Phœbes' nests, and, indeed, until other species are nesting in numbers, the Phœbe is the chief mainstay of the Cowbird. Not infrequently the Cowbird deposits an egg in a nest before the Phœbe has laid any of her own, but this does not seem to make much difference to the owner. In at least two cases where I knew the Cowbird had laid first, the nest was not forsaken but the Phœbe laid her clutch of eggs as though there were no strange eggs present. On two occasions, however, I have found Cowbirds' eggs partly buried in the bottom of the nest; in one case there being in addition to the buried egg another Cowbird's egg and two Phœbe's on top. On this point Bendire (1895, p. 274) says:

"Occasionally they build a new nest on top of the old one, and this is sometimes done to get rid of the Cowbirds' eggs that may have been deposited by these intruders, but ordinarily they do not appear to object much to such additions, and care for them as faithfully as if they were their own."

The history of a typical nest is given below:

Nest found in process of building on April 20, 1921. On April 30 it contained four eggs of the Phœbe and one of the Cowbird (laid on the twenty-ninth). May 2—female was incubating. On the morning of May 3, one of the Phœbe eggs in the nest was broken, and the fragments of the shell of a first Phœbe egg were on the ground beneath the nest. The Phœbe was incubating and was flushed from the next. On May 4 the nest contained only two Phœbe eggs and the Cowbird egg. Same on May 5, 6, 7, and 8. On May 9 the Cowbird hatched. On May 10 the Phœbe was seen incubating or brooding, but not seen to feed the young Cowbird. On May 12 one of the Phœbe's eggs hatched. On May 13 both young birds seemed to be getting along fairly well. The other egg had not yet hatched. On May 14 the young Phœbe was gone and the addled Phœbe egg was on the ground beneath the nest. The young Cowbird had grown considerably and the feather sheaths of the tail, head, and neck had sprouted. The Cowbird kept on growing nicely and on May 18 was put into an observation cage. The Phœbe fed it regularly until May 26 when a very heavy storm arose, and on the morning of May 27 it was found dead in the cage.

The Cowbirds' eggs differ so greatly from those of the Phœbe in size and coloration that experiments were conducted to see just how much diversity in eggs would be tolerated by the Phœbe, with the result that everything that was tried from Robins' to House Wrens' eggs were incubated, and, in the case of the House Wrens, hatched and reared.

Phœbes' nests are often badly infested with parasitic insects which sometimes are present in sufficient numbers to kill off the young birds. In such extreme cases young Cowbirds are probably affected, too, but usually they do not seem to suffer from external parasites.

About two hundred and twenty cases have come to my notice, distributed among the following states: Montreal, Canada, New York, Pennsylvania, Connecticut, south to West Virignia, and west to Ohio, Michigan, and Iowa.

Myiochanes virens (Linn.). Wood Pewee.

A not uncommon victim of the Cowbird. A nest was found at Ithaca on June 7, 1921, containing two eggs and one egg of the Cowbird. Unfortunately the nest was accidentally destroyed at the time. On July 8, 1921, a young Cowbird was observed following a Wood Pewee which always turned on it trying to drive it off whenever it came too close.

As many as four Cowbird eggs have been reported from a single nest of this species, but such cases are extremely rare. (See Green T. R., Oologist, vol. XXXIV.

1917, p. 1914.) About 3 dozen records have come to my notice but these probably represent a small percentage of the cases found. These records range from Connecticut and New York, west to Ohio, Indiana, Illinois, and Michigan. The Cowbird in question is the typical race, *M. ater ater.*

Myiochanes richardsonii richardsonii (Swainson). Western Wood Pewee.
Myiochanes richardsoni richardsoni (A.O.U., 1910, p. 214).

This species seems to be a rather uncommon host of the small, southwestern race of the Cowbird—the subspecies *obscurus.* Bendire (1895, p. 293) records a nest of this bird found on May 31, 1891, at Prescott, Arizona, with two eggs of its own and one of the Dwarf Cowbird.

Empidonax virescens (Vieillot). Acadian Flycatcher.

A generally uncommon, though at times, locally, a fairly common victim of the Cowbird.

Bendire (1895, p. 304) writes of this species, "Occasionally the Acadian Flycatcher builds a double nest—for instance when a Cowbird has deposited an egg in one just completed, before the owner has laid in it. Mr. W. E. Loucks of Peoria, Illinois, sends me such a record. The nest found by him contained a Cowbird's egg in the lower story and three fresh eggs in the upper one. The Acadian Flycatcher is one of the species on which this parasite imposes occasionally."

Evermann, in Indiana, finds that, "this bird is one of the most frequent victims of the Cowbird."

At Charlottesville, Virginia, on June 23, 1923, I found a deserted nest of the Acadian Flycatcher with one egg of the owner and one of the Cowbird, both addled.

I know of but few definite records, although many writers claim to have found parasitized nests of the Acadian Flycatcher. Twenty-two records, ranging from New England, and Pennsylvania, west to Ohio, Indiana, Illinois, and Michigan have been found. All refer to *M. ater ater.* Of these twenty-two no fewer than twelve come from southern Pennsylvania (Jacobs, Oologist, May, 1924, pp. 52-54).

Empidonax traillii (Audubon).
Empidonax trailli (A.O.U., 1910, p. 215).

Two races of this species are victimized by the Cowbird.

a. *Empidonax traillii brewsteri* Oberh. Traill's Flycatcher.
Empidonax trailli trailli (A.O.U., 1910, p. 216.)

A rather uncommon dupe of the Cowbird, except in Southern California. Bendire (1895, p. 307) writes that in Colorado the Little Flycatcher (Traill's) is not infrequently imposed upon by the Cowbird, as he has taken several nests containing one of their eggs. Forty records have come to my attention, two from Colorado, and the rest from California. The California records refer to the Dwarf Cowbird, subspecies *obscurus,* while the Colorado records are probably referable to *M. ater ater.*

Further east this bird is replaced by:

b. *Empidonax traillii traillii* (Audubon). Alder Flycatcher.
Empidonax traillii alnorum (A.O.U., 1910, p. 216).

This flycatcher is a rather rare molothrine victim. Bendire (1895, p. 311) writes that—"The Cowbird occasionally deposits an egg in the nest." Pohling (Orn. and

Ool., 1889, pp. 133-134) records a nest of this bird at Quincy, Illinois, containing a Cowbird's egg. He records it as a nest of Traill's Flycatcher, but the locality would make it the Alder. Cook, in his unreliable list, mentions it as a molothrine host in Michigan. An uncertain record is Anderson's statement (Birds of Iowa, 1907, p. 299) that he had a nest of Traill's Flycatcher with a Cowbird's egg imbedded in it. It is hard to determine whether this was *brewsteri* or *traillii.* Probably the latter.

Empidonax minimus (W. M. and S. F. Baird). Least Flycatcher.

An uncommon victim. Several parasitized nests have been definitely recorded, but I find no reason for believing it to be one of the commonest fosterers of the Cowbird anywhere, as did Baird, Brewer, and Ridgway in New England. To say the least, if they had many records on which to base their statement, those records have not been published. I have found ten records distributed among the following states: New England (Baird, Brewer, and Ridgway), Iowa, North Dakota, and Montana.

Pyrocephalus rubinus mexicanus (Sclater). Vermillion Flycatcher.

An uncommon victim of the Dwarf Cowbird.

J. C. Merrill (Proc. U. S. Nat. Mus., Vol. I, 1878, p. 142) writes of a nest of this species found on May 10, 1877, which ". . . . contained a young Dwarf Cowbird and three addled eggs which latter I removed. On revisiting the same nest ten days later I found three fresh eggs on which the female was sitting. As the young Cowbird could not have been fledged by this time, it would seem as if the Flycatchers, on finding their eggs had been removed, had thrown out the parasite egg and laid again." This conclusion is doubtless wrong, as the young Cowbird never stays in the nest more than ten days and it was evidently several days old when first found. Furthermore the last clause is confusing, the mention of the "parasite egg" evidently referring to the young Cowbird.

Bendire (1895, p. 324) records a nest with two fresh eggs and one of the Dwarf Cowbird, ". . . . which occasionally lays in the nest of this species, two such instances having come under my (his) observation." On page 442 Bendire places this species fourth in the order of frequency of parasitism!

Otocoris alpestris (Linn.). Horned Lark.

Two races of this bird are known to have been victimized by the Cowbird: the first,

a. *Otocoris alpestris praticola* (Henshaw). Prairie Horned Lark.

Is a relatively uncommon dupe. Of course the early nesting of this bird precludes all possibility of its first nest being affected, and all records of parasitism are of later broods. Several records have come to my notice, the most definite of which are:

1. A nest found by W. A. Strong at Imes, Franklin County, Kansas, on May 20, 1900, with three eggs and one egg of the Cowbird.
2. A nest recorded by P. B. Peabody in the Osprey, III, April, 1899, p. 118, containing two Cowbird eggs.
3. A set with two Cowbird eggs in the collection of Mr. R. M. Barnes of Lacon, Illinois.

There are four other less definite records in my files.

In the northwest this race is replaced by

b. *Otocoris alpestris leucolœma* (Coues). Desert Horned Lark.

Which probably is victimized to a similar extent, but for which there is but one definite record. Walter Raine, in an article on Bird Nesting in Northwest Canada (Nidiologist I, no. 8, April, 1894, p. 120), lists the Horned Lark as a victim of the Cowbird. The region in question at that part of his manuscript seems to be Fergus County, Montana. In Silloway's "List of the Birds of Fergus County, Montana," the Desert Horned Lark is the only form given as breeding in that area and is recorded as being very common. Therefore it seems that Raine must have referred to this race.

Cyanocitta cristata bromia (Oberh.). Northeastern Blue Jay.
Cyanocitta cristata cristata (A.O.U., 1910, p. 222).

Dr. Oberholser lists this bird as a victim of the Cowbird.

Dr. T. S. Roberts writes me that while he has no definite record, he has, ". . . . a very distinct recollection of finding at least once the egg of a Cowbird in the nest of a Blue Jay."

In the Ornithologist and Oologist, XV, no. 2, February, 1890, p. 31, there is a paragraph signed P.B.W. to this effect, "I have a set of the Meadowlark—also one of the Blue Jay, containing eggs of the Cowbird . . . . in my store." This is rather ambiguous and certainly not very reliable. Dr. Robert's "distinct recollection" is of more value and importance than this apparent record.

The eggs of the Blue Jay are so much larger than those of the Cowbird that there is little probability of the latter ever hatching if present.

Dolichonyx oryzivorus (Linn.). Bobolink.

A not uncommon host. Several instances have come to my notice, while Gabrielson (Wilson Bull., XXVI, no. 2, June, 1914, p. 79) says that this species is one of the birds most frequently victimized in Iowa. He records a nest June 12, 1910, with four Bobolink and two Cowbird eggs.

Silloway, in Judith Basin, Montana, records a nest on June 14, with three eggs of the owner and two of the Cowbird.

The Bobolink has also been reported as a molothrine victim in Connecticut, Michigan, and New York.

When we remember what a small percentage of Bobolinks' nests are ever found, the apparent scarcity of records loses much of its meaning, although the percentage of nests parasitized is probably not affected.

Xanthocephalus xanthocephalus (Bonaparte). Yellow-headed Blackbird.

A locally not uncommon victim. Dr. T. S. Roberts in his "Study of a Breeding Colony of Yellow-headed Blackbirds" (Auk, vol. XXVI, no. 4, Oct., 1909, pp. 371-389), records three parasitized nests in one colony of these birds.

Lincoln (Auk, XXXVII, no. 1, Jan., 1920, p. 69) writes that in the Clear Creek district, Colorado, Yellow-headed Blackbirds seem to be one of the species most generally imposed upon.

Loucks (Ornithologist and Oologist, XVIII, no. 8, Aug., 1893, p. 109) records a victimized nest in Illinois.

As many as six eggs of the Cowbird have been found in a single nest along with four of the owner. (See Henninger, June Birds of Laramie, Wyoming, Wilson, Bull., XXVII, no. 1, March, 1915, p. 232).

There are cases on record from Illinois, Minnesota, Colorado, Wyoming, and N.W. Canada.

Agelaius phœniceus (Linn.).

Four races of this bird have been found to be victimized.

a. *Agelaius phœniceus predatorius* (Oberh.). Red-winged Blackbird.
Agelaius phœniceus (A.O.U., 1910, p. 233).

A fairly common but rather local victim. At Ithaca, a region where this species has been exhaustively studied (See Allen, A. A., "The Red-winged Blackbird," Proc. Linn. Soc., N.Y., no. 24-25, April 15, 1914), hundreds of nests have been found but never with any Cowbirds' eggs. The Cowbird is very common in this region, but seems to leave all marsh nests alone. Wolcott (Bull. Mich. Orn. Club, III, no. 2, April, 1899, p. 18) writes that in Michigan he never found Cowbirds' eggs in Redwings' nests, while in Nebraska it was not an uncommon accurrence. He adds the following interesting notes.

"The owners of the nest, in case eggs of their own have already been deposited, apparently peck holes in all, including that of the intruder, and desert the nest. But in one instance a nest was found where the single still fresh Cowbird egg which it contained had been almost wholly buried beneath a new floor, and above this were four Blackbirds' eggs . . . . considerably advanced in incubation." If the Red-wings really pecked the holes in the eggs it would be a very significant fact, but there is no conclusive evidence to show that the holes were not the work of Marsh Wrens.

Jensen, in North Dakota, writes that he has several times found two or three Cowbirds' eggs in the nests of this species.

W. A. Goelitz at Ravina, Illinois, writes (Oologist, XXXIII, 1916, p. 147) that, ". . . . Until this year I have never found the eggs of this bird (Cowbird) in Redwings' nests, but in a little colony of some twenty-five pairs of Red-winged Blackbirds, I destroyed eleven Cowbird eggs on June 17, and six on June 27 of the present season."

This is certainly an unusually high percentage of parasitism, unequalled anywhere for this species. Over fifty records have come to my notice, ranging from Connecticut, Ohio, and Indiana, west to Michigan and Illinois, and south to Oklahoma.

b. *Agelaius phoeniceus fortis* Ridgway. Thick-billed Red-wing.

This race is the western counterpart of the preceding form and what has been said of that race probably applies to this one also. Lincoln considers this bird one of the species most generally victimized in Colorado (Auk, 1920, p. 69). I have several other records from Colorado, Nebraska, North Dakota, Saskatchewan, and Alberta.

If Dr. Oberholser is correct in separating the birds from North Dakota, Saskatchewan, and Alberta, from those of the Great Plains, the records from those localities would have to be considered as referring to the form *arctolegus.*

c. *Agelaius phoeniceus neutralis* Ridgway. San Diego Red-wing.

This race is listed by Dr. Oberholser as a victim of the typical form of the Cowbird, *M. ater ater.*

d. *Agelaius phoeniceus megapotamus* Oberh. Rio Grande Red-wing.

Agelaius phoeniceus richmondi (part) (A.O.U., 1910, p. 234).

This race is listed as a victim of the Dwarf Cowbird, *M. ater obscurus,* by Dr. Oberholser, as well as by Simmons (Birds of the Austin Region, 1925, p. 172).

Sturnella magna magna (Linn.). Meadowlark.

A rather uncommon host. Bendire (1895, p. 460) says, "This bird is occasionally imposed on by the Cowbird, but not very often, and an instance has been recorded where a second nest was built over the one containing the parasitic egg." This bird is listed as a molothrine victim by a good number of writers, but definite records are few.

Eifrig, (Field Notes from the Chicago Area, Wilson Bull., XXVII, no. 3, Sept., 1915, p. 418) records a nest of the Meadowlark, May 5, with three eggs of the owner and two of the Cowbird. Another egg of the Meadowlark was found just outside the nest, another a foot away in the bird's way of approach. He raises the query, "Did the Meadowlark feel her complement of eggs to be complete, or did the Cowbird maneuver the eggs out, or did she cajole Sturnella by other means into laying outside the nest?" He thinks the first solution is probably the correct one, but this of course is merely a guess and need not be accepted. In a later paper, (Auk, XXXVI, no. 4, Oct. 1919, p. 520), the same author states that he has, ". . . . repeatedly found nests of the Meadowlark . . . . . with one or more eggs of the Cowbird, and one or more of all the eggs of the rightful owner apparently rolled out. An example of this was one found June 24, 1917, with two Cowbird eggs inside and four Meadowlark eggs outside. . . . ." Apparently the Meadowlark is a commoner host near Chicago than in most other places. The fact that the rightful eggs are so often found out of the nest is puzzling and deserves study. It would be an easy matter to determine at least whether the Meadowlark is responsible, by puteting a couple of Cowbirds' eggs in a nest containing eggs, and watching to see what happens when the bird returns to the nest. On the face of it, it seems very unlikely that the Meadowlark would deliberately roll out her eggs. Whether the Cowbird is to blame is a point well worth careful investigation.

There are cases on record from New England, New York, Pennsylvania, Michigan, Illinois, and Iowa.

Sturnella neglecta Aud. Western Meadowlark.

Generally an uncommon victim but apparently frequently imposed on locally.

Bendire (1895, p. 465) writes that this species is occasionally imposed upon by the Cowbird.

Silloway, in Judith Masin, Montana (Oologist, XXXIV, 1917, p. 45), records a nest of this bird with two eggs and five eggs of the Cowbird. He remarks, ". . . . In fact it was the first time I had ever found the parasite's eggs in a nest of this species, though later I discovered that the Cowbird frequently imposes upon the Meadowlark in the northwest."

I know of only five definite records, all from North Dakota and Montana.

Icterus melanocephalus auduboni Giraud. Audubon's Oriole.

Apparently this oriole is rarely victimized by the Dwarf Cowbird. Near Brownsville, Texas, I found a deserted nest of this species containing one egg of the Dwarf Cowbird and one of the Red-eyed Cowbird and none of the owner. (Auk, 1925, p. 551). This is the only record I know of.

Icterus cucullatus Swainson. Hooded Oriole.

Two races of this fine bird have been victimized by the small, southwestern form of the Cowbird.

a. *Icterus cucullatus sennetti* Ridgway. Sennett's Oriole.

Bendire, (1895, p. 475), says of this species,—"The Hooded Oriole is considerably imposed upon by both the Red-eyed and Dwarf Cowbirds, and in a few instances parasitic eggs of both species are found in the same nest."

In the lower Rio Grande valley, during May, 1924, I found 16 nests of this bird, of which one contained an egg of the Dwarf Cowbird in addition to 2 of the Oriole. (Auk 1925, p. 550)

b. *Icterus cucullatus nelsoni* Ridgway. Arizona Hooded Oriole.

Scott, (Auk II, no. 2, April 1885, p. 163), records a nest of this bird on July 20 with four eggs and one of the Cowbird. In another paper, (Auk IV, no. 1, Jan. 1887, p. 22), he also records this species being victimized by the Cowbird.

Icterus spurius (Linn.). Orchard Oriole.

A not uncommon host. It is known to have been victimized by both the typical form of the Cowbird and the smaller race. Bendire, (1895, p. 481.) says of it. "In the northern parts of its range the Orchard Oriole is more or less imposed upon by the Cowbird."

Mr. A. C. Bent writes me that he has in his collection a nest of this species containing a Cowbird's egg. There are also records from Iowa, Michigan, Connecticut, and Texas.

Mr. Roy W. Quillin writes me that at San Antonio, Texas, this oriole is very frequently parasitized by the Dwarf Cowbird.

There are several Texan records in the files of the Biological Survey.

Icterus galbula (Linn.). Baltimore Oriole.

An uncommon victim. Bendire, (1895, p. 486), says "this species is rarely imposed upon by the Cowbird."

Gregg, in Chemung County, New York (Proc. Elmira Acad. of Science, vol. I, no. 1, June, 1891, p. 26), records finding a nest of this bird with two young Orioles hardly fledged and one young Cowbird big enough to fly.

S. E. Parshall, (Orn. and Ool. IX, no. 11, Nov. 1884, p. 139), found a deserted nest containing three eggs of the Orioles, and three of the Cowbird and three more of the Cowbird covered up.

B. H. Warren (Birds of Pennsylvania, 1890, pp. 209-210) writes that, ". . . . on three occasions I have discovered the shattered remains of these eggs (Cowbirds), directly beneath the pendant nests of Baltimore Orioles. . . . . It may be that this species sometimes . . . . tosses out the alien eggs."

There are other records from Indiana, Iowa, and Michigan.

Icterus bullocki bullocki (Swainson). Bullock's Oriole.
Icterus bullocki (A. O. U., 1910, p. 238).

A rather rare victim. It is listed by Bendire as a host of both races of the Cowbird, but I have found but a single record other than for the subspecies *obscurus*. On page 442 Bendire writes "Bullock's Oriole may occasionally rid herself of the parasite egg; at any rate I noticed the remains of one lying under a nest of this species, with portions of one of her own. The nest contained only three eggs of the rightful owner and the bird was sitting on these." This note assumes more interest in the light of Warren's observations in Pennsylvania on the last species.

Mrs. Margaret M. Nice writes me that Mr. R. C. Tate of Kenton, Cimarron County, Oklahoma, found a nest of Bullock's Oriole on July 12, 1911, with one young Oriole and two young Cowbirds; two young Orioles being dead on the ground beneath the nest.

In Arizona this handsome Oriole is occasionally parasitized by the Dwarf Cowbird.

Euphagus cyanocephalus cyanocephalus (Wagler). Brewer's Blackbird.
Euphagus cyanocephalus (A. O. U., 1910, p. 239)

Bendire thought this bird was only occasionally imposed upon, but subsequent observations have shown it to be a common host of the Cowbird in the plains and prairies of the West.

A. A. Saunders (Auk, XXVIII, no. 1, Jan., 1911, p. 40), writing of the Cowbird in Gallatin County, Montana, says, "I have found their eggs more often in the nests of Brewer's Blackbird than any other species," and, in the same paper, says of the Brewer's Blackbird, "a large percentage of their nests contains Cowbird's eggs."

P. B. Peabody, (Warbler V., 1909, p. 16), in commenting on a photograph of a nest of this species with a Cowbird's egg, says, "This photograph reveals the presence, in the nest, of an egg of the Cowbird. This is characteristic. Comparatively few nests escape that arrant parasite. . . . ."

Betts records this species as victimized in Colorado, Rust in Idaho, Saunders and Cameron from various counties in Montana.

The Cowbird in question is *M. ater artemisiæ*.

Quiscalus quiscula aeneus Ridgway. Bronzed Grackle.

Barnes (Oologist, XXXV, 1918, p. 109) records a nest of this bird with four eggs and two of the Cowbird, and writes me that he has in his collection two sets of Bronzed Grackle with Cowbird eggs, both taken ". . . . May 10, 1896, a little over one mile from this place (Lacon, Ill.), in the overflow bottoms of the Illinois River, both nests in willow trees, one only eighteen inches above the water and the other four feet up. Each of the nests contained one Cowbird and all of the eggs were fresh, the nests were less than a hundred feet apart; never before or since have I found Cowbird's eggs in the nest of this species."

In the same article (ibid.), he also records a set of the Purple Grackle with a Cowbird's egg. This he later wrote me was a mistake, and that both sets were of the Bronzed Grackle.

Mr. Alfred Eastgate informs me that he has found an egg of a Cowbird (subspecies *artemisiæ*), in a nest of this bird in North Dakota.

Keyes and Williams (Cat. Birds of Iowa, p. 25) list the Bronzed Grackle as a victim of the Cowbird.

Strumberg (Oologist, 1879, p. 79) writes from Galesburg, Illinois, that ". . . . a young collector here found a nest containing five eggs of the Crow Blackbird and one of the Cowbird. The latter was nearly covered up with the lining of the nest."

Carpodacus mexicanus frontalis (Say). House Finch.

One record. Jensen (Auk, 1923, p. 461) lists this bird as a victim of the typical form of the Cowbird, *Molothrus ater ater,* in northern Santa Fe County, New Mexico. The lack of further records seems to indicate the relative scarcity with which this finch is parasitized.

Carpodacus purpureus purpureus (Gmelin). Purple Finch.

This species is occasionally imposed upon by the Cowbird, there being several cases on record. At Ithaca, a clutch of eggs of this bird containing a Cowbird's egg was reported by A. H. Alberger (Orn. and Ool., XV, no. 3, March, 1890, p. 46).

Sage, in his "Birds of Connecticut," records two nests, each with a Cowbird's egg. In addition to this is a record by Paul Hoffman from Rockville, Connecticut, of a nest with four eggs and three Cowbird eggs, making seven in all. (Orn. and Ool. VI, no. 7, Sept. 1881, p. 53.)

Several other records have come to my notice, from New York and Connecticut.

As many as four eggs of the Cowbird have been found in a single nest of this bird together with seven of the owner.

Passer domesticus domesticus (Linn.). European, House, or English Sparrow.

Not in A.O.U., Check-List. 1910.

This highly successful alien seems to be practically free from the Cowbird's molestation. Only three records have come to my notice. The following statement is taken from Mearns' list of the birds of the Hudson Highlands, (Bull. Essex Institute, vol. XII, 1878, p. 23). In discussing the Cowbird he says,—

"One of the eggs was hatched by European House Sparrows in Highland Falls, N.Y.; the young Cowbird thrived and remained with the sparrows in the town for some time."

Davie, (1889), lists this bird as a molothrine victim, probably on the basis of the above instance.

R. B. Rockwell (Condor 1909, p. 92) records a partially incubated egg of the Cowbird in the nest of an English Sparrow at Barr, Colorado.

Burleigh (Wilson Bull. 1923 pp. 90-91) found a Cowbird's egg in a nest of the House Sparrow in Allegheny County, Pennsylvania. The nest was in a small bird box and contained five eggs of the Sparrow. The Cowbird's egg was removed by Mr. Burleigh.

Astragalinus tristis (Linn.).

Two races of the Goldfinch are known to be victims of the Cowbird.

a. *Astragalinus tristis tristis* (Linn.) Goldfinch.

A fairly common victim. At Ithaca, a region where both this species and the Cowbird are common, and where many nests of this bird have been found, there are no cases on record. Dr. A. A. Allen, whose observations on this region extend over a long period, has never known of a Cowbird laying in a Goldfinch's nest, and my observations tend to show that the laying season of the Cowbird is on the decline at the time when the Goldfinch starts to nest in numbers. Eaton, (1914), however, lists this bird as one of the common victims of the Cowbird in New York, so evidently there is considerable variation locally.

Wintle, (1896, p. 91), in Montreal, records a nest on July 25, 1896, with five eggs and one of the Cowbird, and Jensen, (Auk, XXXV, no. 3, July 1918, p. 347), writing of the birds of Wahpeton, North Dakota, reports a nest of the Goldfinch on August 6 with four fresh eggs and one Cowbird's egg. This is over a month later than my latest date for a Cowbird's egg at Ithaca.

Alexander Wilson was the first to record the Goldfinch rearing a young Cowbird.

Occasionally this species covers up the strange egg after the manner of the Yellow Warbler. At least two such cases are on record, (Samuels, 1876, pp. 339-341, and Davison, Auk IV, no. 3, July 1887, pp. 263-264.).

I have found records from Montreal, New England, New York, and Ohio, west to Indiana. Illinois, and North Dakota, and south to Oklahoma.

b. *Astragalinus tristis salicamans* (Grinnell). Willow Goldfinch.

I have nine records for this form; La Jeunesse (Condor, 1923, pp. 31-32) records a nest of this bird in Alameda County, California, on May 23, 1922, with three eggs of its own and one of the Dwarf Cowbird; Hanna (ibid., 1928, p. 161) records eight victimized nests.

Calcarius ornatus (J. K. Townsend). Chestnut-collared Longspur.

Probably a not uncommon victim in proper localities. The lack of records is doubtless due to the scarcity of observers in the breeding range of this bird.

R. P. Currie (Oologist, IX, no. 11, Nov., 1892, p. 243) says,

"In this place (Grand Forks, North Dakota), the nest of the Longspur is a common repository for the eggs of the Cowbird; 3, 2, or only 1, being found per nest."

Raine, (Nidiologist I., no. 8, April 1884, p. 120), lists this species as a molothrine host in western Canada. It is also given by Bendire in his list.

Mr. Alfred Eastgate informs me that he has found this species victimized by the Cowbird.

All these records refer to *M. ater artemisiæ*.

Rhynoophanes mccownii (Lawrence). McCown's Longspur.
Rhyncophanes mccowni (A.O.U., 1910, p. 252).

Practically nothing is known of this species as a victim of the Cowbird. This is not surprising when we consider how little is known of the breeding habits of this bird. It is listed by Bendire, (1895), as a molothrine host. Mr. Alfred Eastgate informs me that he has found this bird to be a victim of the Cowbird, (subspecies *artemisiæ*) and Raine (1894) mentions it as being parasitized in western Canada.

Pooecetes gramineus (Gmelin). Vesper Sparrow.

Two races of this bird have been imposed upon by the Cowbird.

a. *Pooecetes gramineus gramineus* (Gmelin). Vesper Sparrow.

A common victim. At Ithaca but one record. On June 22, 1921, an adult of this species was watched feeding a young Cowbird twice its size. I could not make out what it was feeding it except that several times some rather long-winged insects were given the young bird.

Eaton, (1914), records this bird as one of the commonest dupes of the Cowbird in New York.

About fifty records, distributed over most of its range, have come to my notice.

b. *Pooecetes gramineus confinis* Baird. Western Vesper Sparrow.

What has been said of the preceeding race doubtless applies here too. Due to the fact that this form inhabits a relatively little worked area, there are naturally fewer records.

A. A. Saunders, (Condor XVI, no. 3, May, 1914, p. 136), reports finding parasitized nests of this bird in Teton and northern Lewis and Clark Counties, Montana, and Cameron, (Auk, XXV, no. 1, Jan. 1908, p. 39), gives an instance in Custer or Dawson County, Montana.

This race is also listed by Bendire, and in the collection of the American Museum of Natural History at New York, there is a Cowbird's egg taken from the nest of a Western Vesper Sparrow.

In the files of the Biological Survey are two records, the first a nest of this bird in Idaho, Dickey and Thousand Springs Valley, June 1912, with two eggs and two of the Cowbird (*artemisiæ*); the other a nest near Houston, Texas, with an egg of the Dwarf Cowbird.

Passerculus sandwichensis (Gmelin).

Two races of this bird have been victimized by the Cowbird.

a. *Passerculus sandwichensis savanna* (Wilson). Savannah Sparrow.

This bird is very seldom bothered by the Cowbird. At Ithaca, New York, on June 22, 1921, I watched a bird of this species feed a young Cowbird more than twice its own size. It was watched for about a quarter of an hour and the intervals between feedings were found to be as follows: 1 min. 12 sec.—22 sec.—41 sec.—2 min. —39 sec.—6 min. 50 sec.—etc. As far as I know this is the only definite record for this subspecies. Knight (1908), in his Birds of Maine lists it as a host of the Cowbird, but gives no data.

b. *Passerculus sandwichensis alaudinus* Bonaparte. Western Savannah Sparrow.

This race, the western representative of the preceding, is more frequently victimized.

Coues, (Field Notes of Birds Observed in Dakota and Montana, etc., 1878, p. 588.) records a nest with two Cowbird's eggs; E. R. Warren, (Condor XII, Jan. 1910, p. 36), a nest in Colorado with four eggs and one of the Cowbird; Horsbrugh, (Ibis series 10, vol. IV, 1916, p. 688), a nest in Alberta with five eggs and two of the Cowbird; Bent, (Auk, XXV, no. 1, Jan. 1908, p. 28), several nests in Saskatchewan, one of which contained four eggs of the Cowbird and none of the rightful owner; Ferry, (Auk XXVII no. 2, April 1910, pp. 199-200), a similar case also in Saskatchewan. Mr. R. M. Barnes writes me that he has in his collection a set of this bird containing a Cowbird egg.

Ammodramus bairdii (Audubon). Baird's Sparrow.
Ammodramus bairdi (A.O.U., 1910, p. 256).

So little is known of the breeding habits of this bird that it is impossible to say to what extent it suffers from the Cowbird. Two records have come to my notice, as follows: Walter Raine, (Bird Nesting in Northwest Canada, Nidiologist, I., no. 5, Jan. 1894, p. 71), reports a nest of Baird's Sparrow containing three eggs of the Cowbird and two of its own.

Mr. Alfred Eastgate informs me that he found a Cowbird's egg in a nest of this species.

Both records refer to the northwestern form of the Cowbird, (*M. ater artemisiæ.*)

Ammodramus savannarum (Gmelin).

Two races of this bird are known to be parasitized by the Cowbird.

a. *Ammodramus savannarum australis* Maynard. Grasshopper Sparrow.

A very uncommon victim. Watkins, (1900, p. 71), lists it as a molothrine host in Michigan. It is not mentioned in Bendire's list, and I know of no definite nest records.

b. *Ammodramus savannarum bimaculatus* Swainson. Western Grasshopper Sparrow.

Mr. Alfred Eastgate writes me that he found this bird victimized by the Cowbird (*M. a. artemisiæ*) in North Dakota. Bruner (Report of the Nebraska State Horticultural Soc., 1896, p. 125) lists the Grasshopper Sparrow as a molothrine host in Nebraska. The Nebraska bird is *bimaculatus.*

Passerherbulus henslowii sussurans Brewster. Henslow's Sparrow.
Passerherbulus henslowi henslowi (A.O.U., 1910, p. 257).

So few nests of this species have been found that it is not possible to state definitely the extent to which it is imposed upon by the Cowbird. Also that fact that it is so local in its breeding range, makes data on one particular colony of less value than with most species, as there is probably some difference between the conditions in different colonies. I know of but a single recorded instance of this species being affected by the Cowbird.

H. S. Hathaway, (Auk XXX, no. 4, Oct. 1913, p. 555), reports a nest in Rhode Island with three fresh eggs and one of the Cowbird on May 28, 1911.

Passerherbulus leconteii (Audubon). Leconte's Sparrow.
Passerherbulus lecontei (A.O.U., 1910, p. 258).

Apparently a fairly common victim of the Cowbird in suitable localities. In the Red River Valley, Kittson County, Minnesota, P. B. Peabody, (Auk XVIII, no. 2, April 1901, pp. 131-132), found fourteen nests of this bird of which four were parasitized. The following notes are from his paper.

The four nests in question were:

1. June 5—with three eggs and one egg of the Cowbird; incubation advanced.
2. June 5—with one egg and one egg of the Cowbird; soon deserted.
3. June 2—with two "dead" eggs and one half grown Cowbird.
4. June 3—with three eggs and one egg of the Cowbird; incubation-trace.

This bird is also recorded as a host of the Cowbird in Saskatchewan by Ferry, (Auk, XXVII, no. 2, April, 1910, pp. 199-200).

Passerherbulus nelsoni nelsoni (Allen). Nelson's Sparrow.

Not definitely recorded as a victim of the Cowbird. P. B. Peabody, of Blue Rapids, Kansas, writes me that he remembers very well that one of his associates once found a Cowbird's egg in a nest of Nelson's Sparrow. He has no definite note, or any other way of getting the exact data on this nest. For this reason I put this bird on the hypothetical list.

Chondestes grammacus (Say).

Both the eastern and the western forms of the Lark Sparrow are known to be victims of the Cowbird.

a. *Chondestes grammacus grammacus* (Say). Lark Sparrow.

An uncommon host. Gabrielson in Marshall County, Iowa, (Proc. Iowa Acad. of Sci. XXVI, 1919, pp. 59-60), reports and figures a nest of this bird with two eggs of the Cowbird and three of the owner. Mr. R. M. Barnes writes me that he has in his collection a set of this species with a Cowbird's egg. I also have a record from Oklahoma. It is merely listed by Bendire, who gives no further data.

b. *Chondestes grammacus strigatus* Swainson. Western Lark Sparrow.

R. Graham at Lake Worth, Texas (Ool. XXXIII, 1916, p. 137), found a nest of this bird with three eggs of the owner and two of the Cowbird, on May 13, 1916. In the collection of the U. S. National Museum are two victimized sets of this bird: one taken at Fort Custer, Montana, June 14, 1885, and the other at Brownsville, Texas, May 17, 1891. The Montana record refers to *M. ater artemisiæ* and the Texas record to *M. ater obscurus.* At San Antonio, Texas, the Western Lark Sparrow is a rare victim of the Dwarf Cowbird. Simmons (Birds Austin Region, 1925, p. 172) records it as a victim of the Dwarf Cowbird.

Zonotrichia leucophrys (J. R. Forster). White-crowned Sparrow.
Zonotrichia leucophrys leucophrys (A.O.U., 1910, p. 261).

An uncommon victim. Rust, in Fremont County, Idaho, in 1916, (Condor XIX, no. 2, March-April 1917, pp. 37-39), writes that he found a nest of this species with four eggs and one of the Cowbird, on June 20, under a small bush near running water.

Barnes (Oologist, XXXV, 1919, p. 109) records a set of this bird with four eggs and one of the Cowbird. A case that seems somewhat doubtful because of the locality but that was accepted by Baird, Brewer, and Ridgway, is a nest reported by Mr. H. S. Rodney at Potsdam, New York (Amer. Nat. III, no. 10, Dec., 1869, p. 550). He writes, "On the 15th of May, 1868, I found a nest of the White-crowned Sparrow (Zonotrichia leucophrys) of two stories; containing, in the under, a single egg of the Cow Bunting, and in the upper, two more of the same, together with three of the rightful owners. These were being sat upon at the time by the female bird, and on blowing proved to be pretty well advanced in their incubation."

Zonotrichia albicollis (Gmelin). White-throated Sparrow.

A very uncommon victim. A. R. Cahn, (Wilson Bull. XXXII, no. 4, Dec. 1920, p. 116), reports seeing a female of this species feeding a young Cowbird in Itaska County, Minnesota. In another paper (Trans. Wis. Acad. of Sci., Arts, & Letters, XIX, 1918, p. 497), the same writer records a similar occurrence in Michigan (may refer to same instance with wrong locality in one case).

Rowan (Auk 1922 p. 229) records a young Cowbird in a nest of a White-throated Sparrow at Indian Bay, Manitoba.

J. D. Carter, (Cassinia X, 1906, p. 32), erroneously reports a nest in Monroe County, Pennsylvania, as follows:

"It was a White-throat. The nest contained four beautiful eggs and one nestling, naked except for a tuft or two of blackish down. It was ascertained later that the eggs were quite fresh, so it has been supposed that the nestling was a Cowbird." As the young Cowbird has light grayish and not blackish down, it seems that this supposition was incorrect.

Spizella passerina. (Bechstein.)

Two forms of this bird are affected by the Cowbird.

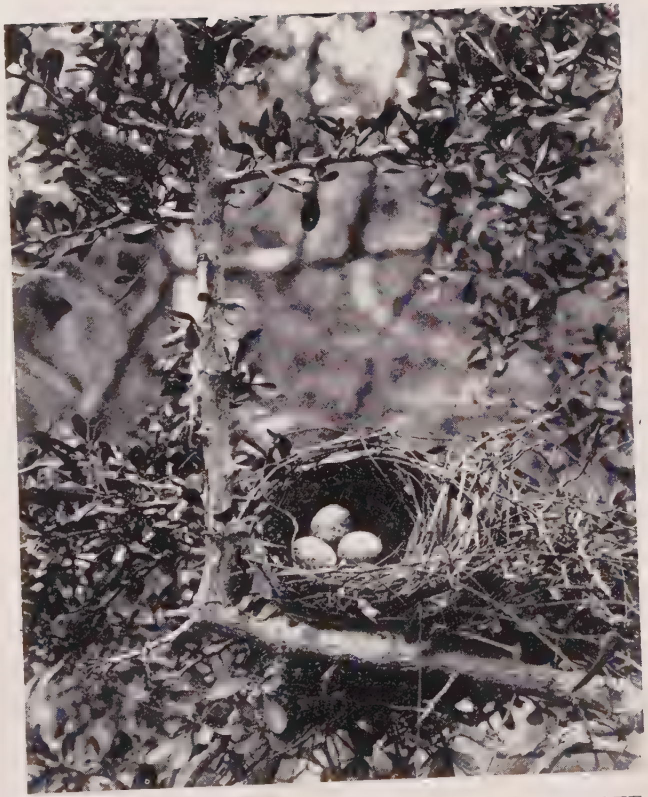
a. *Spizella passerina passerina* (Bechstein). Chipping Sparrow.

It is an extremely common sight to see one of these familiar little birds feeding a big, clumsy Cowbird two or more times its own size. In most places it is one of the most imposed upon species. At Ithaca, over a dozen cases have come under my observation. The percentage of parasitized nests in this species is not as high as in some others such as the Phœbe, Red-eyed Vireo, and Red-start; judging solely by my local records it seems to be about 15 per cent. The great abundance of this bird as a summer resident however, makes it a very conspicuous host numerically. Too much value should not be placed on my estimate as it is only a local approximation. The young Cowbird follows these birds even after it can care for itself, particularly if it finds a pair of these birds leading about a brood of their own. On several occasions I have seen a young Cowbird alone on a lawn picking up bits of food, fly over to a family of Chippies and join them and beg for food as though it were utterly unable to fend for itself. Usually the bird is successful in getting its wants attended to and deprives the rightful owner of a good portion of its food. However, if one comes too close and frightens it, the young Cowbird does not always fly off together with the Chippies, but may go off in a different direction by itself, showing how loose are its connections with its step-foster-parents.

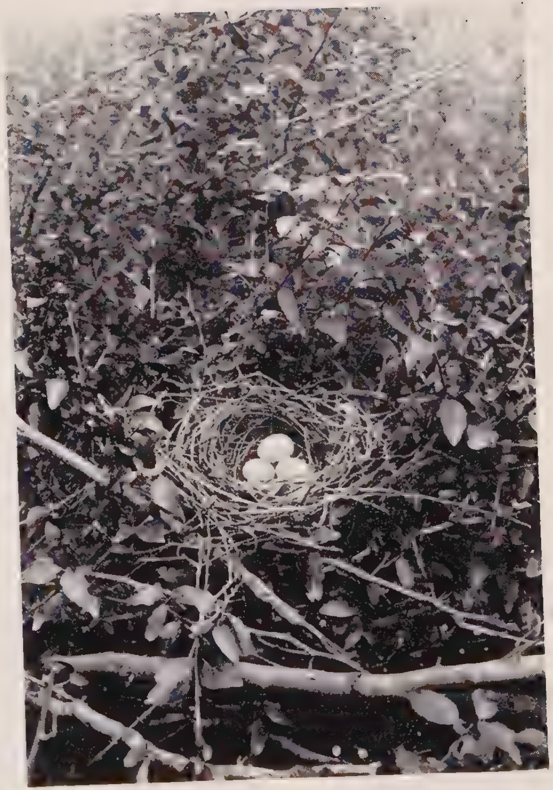
Nuttall (1840, p. 105) records having seen a Chipping Sparrow remove its dead young from its nest which contained a young Cowbird.

The food given to the young Cowbirds by this species consists chiefly of cutworms and small insects picked up on lawns. About three hundred records have come to my notice, ranging from Montreal, Maine, Massachusetts, Connecticut, New York, New

PLATE XX.



Nest of Gray-tailed Cardinal (Richmondena cardinalis canicauda) with Two Eggs of the Owner and One of the Dwarf Cowbird (Molothrus ater obscurus).



Nest of Long-tailed Chat (Icteria virens longicauda) with Three Eggs of the Dwarf Cowbird (Molothrus ater obscurus).

Jersey, and Pennsylvania, west to Ohio, Michigan, Illinois, Minnesota, and Montana, and south to District of Columbia and Oklahoma.

b. *Spizella passerina arizonæ* Coues. Western Chipping Sparrow.

What has been said of the eastern race probably also applies to the western form, although there are very few recorded instances of the latter being affected by the Cowbird. Mr. R. N. Barnes of Lacon, Illinois, informs me that he has in his collection a set of this subspecies with four eggs and one egg of the Cowbird, taken at Garfield, Washington, June 11, 1916, by Pingree I. Osburn, and that besides this he has a number of other parasitized sets taken by other collectors. Jensen (Auk 1923, p. 461) records it as a molothrine victim in New Mexico.

Spizella pallida (Swainson). Clay-colored Sparrow.

A fairly common victim. It is mentioned as a host of the Cowbird in Alberta by Horsbrugh, in northwestern Canada by Raine, in Saskatchewan by Bent and also by Ferry, and in Minnesota by Bailey. Definite nest records are scarce however, and little data seems to have been published.

Spizella breweri Cassin. Brewer's Sparrow.

A poorly known victim.

In the files of the Biological Survey at Washington is a field note by Merritt Cary made in the Upper Green River Valley of Wyoming, as follows:

"A young Cowbird which was being brought up by a Brewer Sparrow was watched with much interest at Cora, Aug. 8. The youngster, fully grown, was over twice the size of the little bird which was industriously feeding it, as it sat awkwardly on a pile of logs, and once as it changed its position to a fence rail. Periodical trips were made by the sparrow to the mown hayfield fifty yards distant, where it would hop about a few minutes, catch a choice insect, and fly back to its overgrown parasite with a peculiar chirp, and after stretching itself up proudly on the tips of its toes to reach the mouth of the Cowbird would quickly place the food in its wide gape and fly back to the field for more. It was simply ludicrous to watch the proud nervous way in which the sparrow would strut up to the Cowbird with food, and stretch itself up to its fullest extent, almost overbalancing itself backward in its attempt (seemingly) to be as large as the young Cowbird. Once the youngster flew away some distance, but apparently kept a hungry eye open for the sparrow, for no sooner had Mrs. Sparrow alighted on the former feeding site than the young Cowbird came flying to her from a distance of twenty-five yards, and alighting on the farther end of the log came toward the sparrow with spread fluttering wings and wide open gape."

There is also a note by H. E. Anthony from the same part of the state under the same date which is so close to the above account that it was probably based on the same individuals.

Jensen (Auk XL, no. 3, July, 1923, p. 461) writes that he has found eggs of the Cowbird in nests of this Sparrow in northern Santa Fé County, New Mexico.

Spizella pusilla pusilla (Wilson). Field Sparrow.

This bird is parasitized not infrequently. At Ithaca, where this species is a common summer resident, I have found it only once with Cowbirds' eggs or young in its care, although it has been made the special object of a number of searches. However Dr. A. A. Allen tells me that in past years he has seen young Cowbirds fed by Field Sparrows. There are many cases on record from other localities, again emphasizing the importance of not generalizing from observations in one or two localities over a relatively few years.

Sage, in Connecticut, reports five nests each of which contained a Cowbird's egg; Anderson, in Iowa, claims this species to be one of the two most parasitized birds; and Dawson, in Ohio, calls this one of the most frequently victimized birds. As many as five eggs of the Cowbird have been recorded from a single nest together with two of the Field Sparrow.

Eighty records have been noticed, distributed among the following states: Connecticut, New York, New Jersey, Pennsylvania, Ohio, Illinois, Iowa, and Oklahoma.

Spizella atrogularis (Cabanis). Black-chinned Sparrow.

A very rare victim. I know of but a single record. In the files of the Biological Survey there is an unpublished record of a nest of this little known sparrow, found by Stokely Logan, 18 miles above Santa Rosa, New Mexico, July 6, 1913, containing a fresh egg of the Dwarf Cowbird.

Junco hyemalis hyemalis (Linn.). Slate-colored Junco.

An uncommon victim.

Wintle, in Montreal, found a nest of this bird on May 27, 1882, with two eggs of its own and three of the Cowbird, and Mousley, in the same general region, (Quebec), (Auk, 1918, p. 291), records seeing a young Cowbird just able to fly, being fed by a Junco. Bicknell, in the Catskill Mountains, New York, writes that, ". . . . Mr. Burroughs . . . . gives instances of its imposition on . . . . Junco hiemalis. . . . ." Read, in northern Ohio, adds this bird to the list of victims of the Cowbird. It is also listed by Bendire and Davie.

Amphispiza bilineata (Cassin). Black-throated Sparrow.

Both races of this bird are victimized by the Cowbird.

a. *Amphispiza bilineata bilineata* (Cassin). Black-throated Sparrow.

In a paper on the birds of the Lower Rio Grande Valley of Texas (Auk XLII Oct., 1925, p. 551), I recorded this bird as a victim of the Dwarf Cowbird. "The Black-throated Sparrow . . . . is the commonest victim of the Dwarf Cowbird early in the season before many other birds are nesting. In spite of the frequency with which this bird is victimized it has never been recorded as a molothrine victim." Mr. Roy W. Quillin of San Antonio writes me that he had previously recorded it as a victim of the Cowbird in Bexar County, Texas (Condor 1918, p. 42), a record that had escaped my notice. The bird is a common victim in Bexar County according to him.

b. *Amphispiza bilineata deserticola* Ridgway. Desert Sparrow.

Apparently an uncommon host of the small southwestern race of the Cowbird. Scott, (Auk IV, 1887, p. 22) records finding eggs of the Dwarf Cowbird in nests of this bird, and Bendire, (1895, p. 443), reports a nest found on June 20, 1872, at Tucson, Arizona with one egg of its own and one of the Dwarf Cowbird, incubation commenced.

Amphispiza nevadensis nevadensis (Ridgway). Sage Sparrow.

A very uncommon victim. Only a single record has come to my notice.

Rust, in Fremont County, Idaho, says, "Cowbird eggs were found in the following nests: ". . . . Sage Sparrow, two, with one of the owner. In the last mentioned instance I removed the two Cowbird eggs, and the mother sparrow deserted her nest." (Condor, XIX, 1917, pp. 38-39.)

Peucaea aestivalis bachmanii (Aud.) Bachman's Sparrow.
Peucaea aestivalis bachmani (A.O.U., 1910, p. 271).

An uncommon victim. I know of only two cases.

E. S. Woodruff, in southern Missouri, (Auk XXIV, 1907, p. 349), records a nest of this bird found on May 27, 1907, with two eggs of its own and three of the Cowbird, all with incubation far advanced. This same nest is recorded by the same writer in another paper, (Auk XXV, 1908, p. 202), and by Widmann, (Trans, Acad. of Sci. of St. Louis XVII, no. 1, Nov. 16, 1907, pp. 189-190).

The other record is a nest found near Bardstown, Kentucky, on May 2, which then contained one egg of the owner. On the next day there was a second egg and also one of the Cowbird. Two days later the eggs had disappeared. (Wilson Bull. XXXIII, June 1921, p. 100).

Peucaea cassini (Woodhouse). Cassin's Sparrow.

A very rare victim. Mr. Roy W. Quillan writes me that at San Antonio, Cassin's Sparrow is rarely intruded upon by the Dwarf Cowbird, probably due to their concealing their nests rather well. He found the parasitic eggs in but one nest.

Aimophila carpalis (Coues). Rufous-winged Sparrow.

Very little is known of this bird as a molothrine victim. Bendire (1895, p. 292) writes that, "Its nest appears to be the one most favored by the Dwarf Cowbird . . . . as the recipient of its eggs."

Davie, (1889, p. 319), in commenting on Bendire's experiences with this bird, says, "About one-half of the nests found contained one or more eggs of the Dwarf Cowbird."

It is strange that nothing more should have come to light if this bird is really the "one most favored" by the Dwarf Cowbird.

Melospiza melodia (Wilson).

One may go to any part of the Cowbird's range—from the hot, dry deserts of Arizona to the cool hills and mountains of Wyoming and Montana, or the rocky valleys of New England—and everywhere find the omnipresent Song Sparrow a victim of this bird. If being victimized carries with it any distinction, then the Song Sparrow is distinguished over a greater area than any other species, certainly in North America, and possibly in the world, few cuculine hosts having ranges coincident with that of their parasite at all comparable with that of *Melospiza melodia.*

Five races of the Song Sparrow have been found to be victimized.

a. *Melospiza melodia melodia.* (Wilson). Song Sparrow.

At Ithaca, the Song Sparrow is one of the birds that may be counted on as a molothrine host every year in good numbers. About a dozen cases have been watched and there were doubtless many others not seen. The eggs of this species and those of the Cowbird are so much alike that it was thought that this might be one of the reasons for the Cowbird's success with this species as a host. Accordingly experiments were made to determine whether this egg resemblance was necessary for their acceptance by the sparrow. A Robin's egg was placed in a nest of this bird which then contained a single Song Sparrow egg. Three more eggs were laid by the sparrow making four eggs and the Robin egg in all. One of the sparrow's eggs was removed and a Chipping Sparrow's egg put in its stead. The bird seemed not to mind and kept on incubating. Finally the Robin egg and one of the Song Sparrow eggs hatched, and both young birds were growing nicely when the nest was destroyed by a severe storm. Apparently similarity in coloration was not essential to success in this case.

Occasionally Song Sparrows partly bury Cowbird eggs or attempt to cover them over if the foreign egg is laid before any of the Sparrows.

As many as seven Cowbird eggs have been found in a single nest of this species, and there are several records of three, four and five eggs to a nest. About three hundred records are in my files, distributed among the following states: Maine, Massachusetts, Connecticut, New York, Pennsylvania, Ohio, Illinois, Michigan, Minnesota, Virginia, and the Provinces of Quebec and Alberta in Canada.

b. *Melospiza melodia saltonis* Grinnell. Desert Song Sparrow.
Melospiza melodia fallax (A.O.U., 1910, p. 273).

This race, fortunately for itself, inhabits a region where the Cowbird is relatively scarce, and consequently is not often bothered. There is no reason, however, for not believing that locally it is one of the chief hosts, although hosts are few numerically in such localities. The only data I have is taken from Bendire, (1895, p. 442). He lists this subspecies as a victim of the Dwarf Cowbird and says, "The largest number of Dwarf Cowbirds' eggs found by me in one nest was three, that of a Desert Song Sparrow, and all of its own eggs were missing."

c. *Melospiza melodia fallax* (Baird). Mountain Song Sparrow.
Melospiza melodia montana (A.O.U., 1910, p. 273).

I have but two records for this subspecies. Bendire, (1895, p. 440), records a nest in El Paso County, Colorado, July 2, 1874, with two Cowbird's eggs and three of the rightful owner. Taylor, (Univ. of Calif. Publ. in Zool. VII, no. 10, Feb. 1912, p. 400), reports a nest in Big Creek Ranch, northern Humboldt County, Nevada, June 15, with two fresh eggs of the owner and one of the Cowbird. "The eggs were cold and the nest had probably been deserted."

d. *Melospiza melodia juddi* Bishop. Dakota Song Sparrow.

This race is mentioned by Dr. Oberholser in his list of the victims of *M. ater artemisiæ.* I have no other data on it.

e. *Melospiza melodia cooperi* Ridgway. San Diego Song Sparrow.

Four records.

Melospiza lincolni lincolni (Audubon). Lincoln's Sparrow.

As far as I know, there are no published records of this bird being victimized by the Cowbird. Mr. S. S. S. Stansell, of Edmonton, Alberta, writes me that he has found the eggs of Cowbirds in nests of this species near Edmonton.

Melospiza georgiana (Latham). Swamp Sparrow.

In spite of the fact that several writers record parasitized nests of this species, I am inclined to consider it a generally uncommon victim. Although the Cowbird frequents the marshes during the spring migration and often in late August and September, it seems to leave most swamp nests alone. At Ithaca, where both species are common there are no records, although it must be admitted that Swamp Sparrow nests are not easy to find.

The Swamp Sparrow is mentioned as a molothrine host in Saskatchewan by Ferry; in Alberta by Stansell, (private communication); in Minnesota by Currier, and in Michigan by Cook. The authenticity of some of Cook's records have been questioned, however. In the collection of the American Museum of Natural History there is a Cowbird's egg taken from a nest of this species. Bendire and Davie also list the Swamp Sparrow as a victim of the Cowbird.

Passerella iliaca schistacea Baird. Slate-colored Fox Sparrow.

Until more is known of the breeding habits of this bird it is not safe to say how much it suffers from the Cowbird.

Ridgway, (1887, p. 501), records a Cowbird's egg in a nest of this bird in Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. This same record is referred to by Baird, Brewer, and Ridgway, (1874, edition of 1905, II, pp. 154-157).

Saunders, (Auk XXVIII, Jan. 1911, p. 40), says of the Cowbird in Gallatin County, "Mr. Thomas found the eggs and young quite commonly in the nest of the Slate-colored Sparrow."

Arremonops rufivirgatus rufivirgatus (Lawrence). Texas Sparrow.
Arremonops rufivirgatus (A.O.U., 1910, p. 278).

Sennett (Bull. U. S. Geol. Surv., 1879, p. 396) lists this bird as a victim of the Dwarf Cowbird. This bird is listed by Bendire (1895, p. 442) as a victim of the southwestern race of the Cowbird, *M. ater obscurus.* In the files of the Biological Survey are two records, both from Texas.

Pipilo erythrophthalmus erythrophthalmus (Linn.) Towhee.

A very common victim. At Ithaca, this species is uncommon and so extremely local that I have not had any experience with it as a molothrine host. This bird is called one of the commonest victims in New York by Eaton; in Connecticut by Sage; in Ohio by Jones; in Indiana by Evermann; in Iowa by Anderson, etc. The Towhee is one of the larger of the common victims of the Cowbird, and with none of its dupes is the latter more uniformly successful. Larger numbers of parasitic eggs have been reported from single nests of this species than from any other bird, and there is not one case on record of a Towhee covering up, or in any way trying to get rid of the strange eggs. The highest record is a nest containing eight eggs of the Cowbird together with five of the Towhee, a set taken in northern Iowa, and now in the collection of Mr. R. M. Barnes. Sanborn and Goelitz, (Wilson Bull. XXVII no. 4, Dec. 1915, p. 444), record a nest of this species, May 14, 1914, Lake County, Illinois, with one egg of its own and eight of the Cowbird. A similar set, one and eight of the parasite, is recorded in the Oologist XXXI, no. 6, June 15, 1914, p. 119. There are also instances of five, four and three eggs of the Cowbird in single nests.

About a hundred and eighty definite records have come to my notice, ranging from New York, Connecticut, and Pennsylvania, south to West Virginia, and west to Ohio, Indiana, Illinois, Michigan, and Iowa.

Pipilo maculatus Swainson.

Three races of this bird are known to have been victimized.

a. *Pipilo maculatus arcticus* (Swainson). Arctic Towhee.

Cameron, (Auk, XXIV, 1907, p. 397, and Auk XXV, 1908, pp. 42-43), records a nest of this bird in Montana on June 20, 1898, with five eggs of the owner and two of the Cowbird. Wetmore, (files of the Biological Survey), found a fresh Cowbird's egg in a nest of the Arctic Towhee at Greybull, Wyoming, June 10, 1910. These two are the only cases I know of.

b. *Pipilo maculatus montanus* Swarth. Spurred Towhee.

Rockwell, (Condor X, 1908, p. 169), calls the nests of this bird one of the favorite repositories for the eggs of the Cowbird in Mesa County, Colorado. I have no other data.

c. *Pipilo maculatus megalanyx* (Baird). San Diego Towhee.

One record (Hanna, Condor, 1928, p. 161), California.

Pipilo aberti Baird. Abert's Towhee.

Brown, (Auk XX, no. 1, Jan. 1903, p. 47), writes that this bird is victimized in Arizona by the Dwarf Cowbird. Unfortunately he gives no further data, and this constitutes all the published information we have on this species. There is an unpublished record in the files of the Biological Survey of a nest found by A. B. Howell, four miles southwest of Gadsden, Arizona, May 20, 1918 with a fresh egg of the Dwarf Cowbird.

Oberholseria chlorura (Audubon). Green-tailed Towhee.
Oreospiza chlorura (A.O.U., 1910, p. 282).

This species was evidently overlooked by Bendire when he compiled his list of the victims of the Cowbird, as Henshaw (1875), recorded a Cowbird's egg in a nest of the Green-tailed Towhee at Fort Garland, southern Colorado.

Rockwell, (1908), lists this bird as one of the favorite hosts of the Cowbird in Mesa County, Colorado.

Mitchell (Auk, 1898, p. 309) writes that in San Miguel County, New Mexico, ". . . . it is one of the birds most frequently imposed upon."

Richmondena cardinalis (Linn.).

Two races of this handsome bird are victimized by the Cowbird.

a. *Richmondena cardinalis cardinalis* (Linn.). Cardinal.
Cardinalis cardinalis cardinalis (A.O.U., 1910, p. 282).

A fairly common victim. About twenty cases and numerous indefinite, but reliable, records have come to my notice. In some places this bird seems to be one of the commonest hosts, while in other localities its status is quite different. Both the typical form, *M. ater ater,* and the small, southwestern race, *M. ater obscurus,* have been found to make use of nests of this bird as repositories for their eggs. The Cardinal is parasitized chiefly in the central parts of its range, as the Cowbird is a rare breeder along the Atlantic seaboard south of Virginia, and does not seem to be especially common in the last named state. My records range from Delaware, Pennsylvania, West Virginia, to Texas, Oklahoma, Iowa, Illinois, Indiana, and Ohio.

There is a case on record of a Cardinal building a two-storied nest, the lower floor containing two eggs of the Cowbird *(M. ater obscurus).*

b. *Richmondina cardinalis canicaudus* Chapman. Gray-tailed Cardinal.
Cardinalis cardinalis canicaudus (A.O.U., 1910, p. 283).

A not uncommon victim of the Dwarf Cowbird. It is listed by Bendire who gives no further data. Near Brownsville, Texas, I found three nests of the Gray-tailed Cardinal of which two contained eggs of the Dwarf Cowbird in addition to the rightful eggs.

Mr. Roy W. Quillin writes me that around San Antonio this bird is rather rarely victimized and is the largest bird troubled by the Dwarf Cowbird in that region.

Simmons (Birds, Austin Region, 1925, p. 172), records it as a victim of the Dwarf Cowbird.

Hedymeles ludovicianus (Linn.). Rose-breasted Grosbeak.
Zamelodia ludviciana (A.O.U., 1910, p. 284).

A fairly common victim. At Ithaca I observed a pair of these birds feeding a full grown Cowbird on July 6, 1922. The food seemed to consist chiefly of cutworms.

Numerous published records from all parts of this bird's range, chiefly from New York, North Dakota, Michigan, Illinois, Iowa, and Ohio, have come to my notice. I know of no instance where more than two Cowbirds' eggs have been found in any one nest of this species.

Hedymeles melanocephalus papago (Oberholser). Black-headed Grosbeak.
Zamelodia melanocephala (A.O.U., 1910, p. 284).

A not uncommon host. Sclater (1912, p. 401) states that in Colorado, ". . . . the Cowbird not infrequently imposed on them." Betts, (1913, p. 204), also notes this bird as a molothrine victim in Colorado, while Silloway, (1917, p. 159), and Saunders (1914, pp. 136, 143) record parasitized nests from different parts of Montana.

Guiraca cœrulea (Linn.).

Two races of this bird are parasitized by the Cowbird.

a. *Guiraca cœrulea cœrulea* (Linn.). Blue Grosbeak.

Apparently a not uncommon victim. I have found very few records, although Plank, (1919, p. 18), says of this bird in Decatur, Arkansas,—"The Blue Grosbeak is one of the worst preyed-on birds. In a nest near a pasture a few years ago I found three Cowbird's eggs in various stages of incubation and one Grosbeak's egg nearly ready to hatch. Another nest contained two Cowbird's eggs and two Grosbeak's. One rarely finds a nest of this species that has not been visited by a Cowbird."

The Blue Grosbeak is listed as a molothrine host by Bailey (1913, pp. 198-201) in Virginia; and also by Bendire, Ingersoll, and Barnes.

Simmons (Birds, Austin Region, 1925, p. 172) lists it as a victim of the Dwarf Cowbird in his region (Austin, Texas).

b. *Guiraca cærulea lazula* (Lesson). Western Blue Grosbeak.

A rare victim of the Dwarf Cowbird. It is mentioned in Dr. Oberholser's list. Aside from this I have no data on it, other than one record from Southern California (Hanna, 1928, p. 161).

Passerina cyanea (Linn.). Indigo Bunting.

A very commonly imposed upon species. At Ithaca, I observed two different pairs of these birds each leading about a young Cowbird.

The earliest, and, to this day, the best account of this species is by George Ord, the friend and editor of Alexander Wilson. In his "Observations of the Cow Bunting of the United States of America" (Mag. of Nat. Hist., J. C. Louden, Ed., February, 1836, pp. 68-69), he records finding the nest of an Indigo Bird on June 14, with two eggs and two of the Cowbird, the Cowbird eggs being apparently laid by different birds. In the early morning of June 21, he found, ". . . . one of the Cow Buntings hatched and the other just emerging from the shell. The next morning one of the young Indigo Birds appeared . . . . ," and the other egg was addled. "The simultaneous hatching of the eggs of the Cowbird proves that they had been deposited by different individuals." This last statement is open to very serious doubt, as it proves nothing at all. The bird would not normally start incubating until all the eggs were laid, and a Cowbird is not likely to deposit an egg after incubation had begun, so there is no reason for accepting Ord's assumption.

"By the 23rd, the two young cow buntings have increased so greatly in bulk, that I became apprehensive that they would soon smother the diminutive indigo bird, which did not appear to be much more than one-fourth of their size. I could perceive, however, that it received a full share of parental attention, its crop exhibiting an ample supply of food. It was frequently in an uneasy position, and seemed to respire with difficulty. At every movement of the buntings (Cowbirds) the little creature would get to the bottom of the nest, and had to struggle hard to relieve itself from their oppressive weight. The following day it was no longer to be seen; it had, probably perished in the night, and had been removed to a distance by its mother, as I sought for it in vain below and about the nest. . . . . On the 25th, the two cow buntings were in good plight; and their pin-feathers were rapidly advancing. Their appetite seemed to increase with their strength, by the 30th, the industry of the foster-parents hardly sufficed to satisfy their wants. It was now evident that the concavity of the nest was not sufficiently capacious to admit of their remaining at ease; for one was continually lying over the other; and in their exertions to nestle side by side the nest became considerably elongated. They were ten days old."

This very detailed account leaves little to be added. A very large number of records from all parts of this bird's breeding range, chiefly from Connecticut, Illinois, Indiana, Iowa, Maryland, Michigan, New York, Ohio, Pennsylvania, Quebec, Virginia, and West Virginia, and Oklahoma have come to my notice. In most of these places the Indigo Bunting is one of the commonest victims of the Cowbird. Ordinarily it is not known to try in any way to rid itself of the strange eggs so frequently foisted upon it, although one instance has come to my notice of an Indigo Bird burying a Cowbird's egg which was deposited before it had any eggs of its own.

Dr. A. H. Cordier found a nest of this bird containing young Indigo Buntings and, on top of one of them, a fresh Cowbird's egg (unpublished record).

Passerina amœna (Say). Lazuli Bunting.

An uncommon victim. Sclater, (1912, p. 405), records a nest of this species from Colorado, containing three eggs of the owner and one of the Cowbird. It is listed as a molothrine host by Bendire, and by Baird, Brewer, and Ridgway, apparently on the authority of Brewer, who supplied most of the biographical matter in that great work. Bailey (Oologist XXXI, 1914, p. 143) also lists this bird, and Hanna (1928, p. 161) records three victimized nests in California.

Passerina ciris (Linn.). Painted Bunting.

A not uncommon victim, but commonly victimized locally. This strikingly colored bird is victimized by both the typical and the dwarf races of the Cowbird. About a dozen records, all from Texas and Mississippi, have come to my notice.

Mr. Roy W. Quillin writes me that around San Antonio the Painted Bunting, Orchard Oriole and Bell's Vireo are the commonest victims of the Dwarf Cowbird. According to him the Painted Bunting does not stand for the imposition of the parasite as well as some other birds, and in about eight cases out of ten they desert their nests when a Cowbird lays in them. It is only when the Bunting has about completed its set of eggs that it will tolerate the addition of the strange egg.

Simmons, (Birds, Austin Region, 1925, p. 172), lists the Painted Bunting as a victim of the Dwarf Cowbird.

Sporophila morelleti sharpei Lawrence. Sharpe's Seedeater.

Apparently a very rare host of the dwarf race of the Cowbird. It is listed by Bendire (1895, p. 442), but, aside from this, I have found nothing about this species.

Spiza americana (Gmelin). Dickcissel.

A not uncommon victim. My records range from Michigan and Iowa to Oklahoma and Texas. About a dozen cases have been reported, but very little data on any of them has been published. As many as four Cowbird eggs have been found in a single nest of this species, together with three of the owner's. (P. Smith, Jr., Orn. and Ool., 1882, p. 182.) This bird is not bothered to the same extent that some other ground-nesting species are.

Around San Antonio this bird is seldom parasitized by the Dwarf Cowbird. Mr. Roy W. Quillin writes me that out of hundreds of nests examined, four contained eggs of the parasite. Simmons (Birds, Austin Region, 1925, p. 172) lists it as a victim.

This bird is victimized by two races of the Cowbird—*M. a. ater* and *M. a. obscurus*.

Calamospiza melanocorys (Stejneger). Lark Bunting.

Locally a fairly common victim, but if considered in a general, comparative way, a rather uncommon one. J. A. Allen (1874, pp. 58-59) says of this bird in Dakota and Montana, "This species proves to be one of the favorite foster-parents of the Cowbird (*M. pecoris*). In a series of eighteen nests, five, or nearly one-third, contained eggs of the Cowbird, two even containing two each, and one had three; while out of twenty-nine nests of other ground-nesting prairie birds, collected at the same time and over the same area, *not one* contained an egg of the Cowbird." On page 59 he writes that the Cowbirds ". . . . thus form no inconsiderable check upon the increase of this bird."

Coues (Birds of the Northwest, 1874, p. 164) says that, "Cowbirds' eggs are frequently found in the nest of the Lark Bunting." In another publication (Field Notes of Birds Observed in Dakota and Montana . . . . etc., 1873-1874, p. 597), the same writer records a nest with two eggs and two of the Cowbird on July 9, 1874. Hoffman (1875, p. 172) also notes an egg of the Cowbird in a nest of this species.

Piranga olivacea (Gmelin). Scarlet Tanager.

Piranga erythromelas (A.O.U., 1910, p. 289).

A fairly common victim. At Ithaca, I observed but one case—a young Cowbird, nearly full grown, was seen being fed by a female Scarlet Tanager. The male was not seen.

About thirty records have come to my notice. J. P. Norris (Orn. and Ool., 1892, pp. 21-22), in describing a series of eggs of this bird, states that of twenty-two nests in his collection, seven contained Cowbirds' eggs. Mulliken (Bull. Mich. Orn. Club, 1899, p. 18) describes a nest of this bird, May 14, containing nine eggs, ". . . . of which five were Cowbirds', all from their appearance laid by different birds." This is the largest number ever taken from a single nest of this species. Hess (Auk, 1910, p. 26) reports a Tanager incubating four eggs of the Cowbird, there being none of her own present. The Tanager is sometimes said to desert if a Cowbird's egg is laid in its nest. This statement needs proof as yet.

That the Scarlet Tanager is parasitized throughout most of its range is shown by records from Connecticut, New York, Pennsylvania, and West Virginia, to Ohio, Indiana, Illinois, Michigan, and Iowa.

Piranga rubra (Linn.).

Two races of this bird are known to be imposed upon by the Cowbird.

a. *Piranga rubra rubra* (Linn.). Summer Tanager.

An uncommon host. I have found five records from Illinois, Kentucky, Virginia, and Texas. Beckham (Jour. Cincinnati Soc. of Nat. Hist., 1883, p. 141) says of this bird in Nelson County, Kentucky, "The nests occasionally contain eggs of the Cowbird." Professor Ridgway writes me that he has found Cowbirds' eggs in nests of this bird in Illinois. It is also listed by Bendire, and in the collection of the American Museum of Natural History there is a Cowbird's egg taken from a nest of this species. Mr. Roy W. Quillin writes me that at San Antonio the Summer Tanager is a common victim of the Dwarf Cowbird and he rarely finds a

PLATE XXI.

Nest of Red-eyed Vireo with Three Eggs of the Owner and Three of Molothrus ater (Only Two Cowbird and One Vireo Eggs Show).

Nest of Black and White Warbler with Four Eggs of the Owner and One of Molothrus ater.

nest which does not contain one or more Cowbirds' eggs. Simmons (Birds of the Austin Region, 1925, p. 172) lists it as a victim of the Dwarf Cowbird.

b. *Piranga rubra cooperi* (Ridgway). Cooper's Tanager.

This bird is listed by Bendire as a host of the Dwarf race of the Cowbird.

Petrochelidon albifrons albifrons (Rafinesque). Cliff Swallow.

Petrochelidon lunifrons lunifrons (A.O.U., 1910, p. 291).

An extremely rare, if not quite accidental host. It is listed by Bendire, who gives no data. In the Ornithologist and Oologist, 1890, p. 92, an unsigned, and therefore unknown to me, author writes that, "Another remarkable instance was reported to me. . . . . In this case the Cowbird had deposited its egg in the nest of a Cliff Swallow." This is all I have been able to find about this bird.

Hirundo rustica erythrogastris Boddaert. Barn Swallow.

Hirundo erythrogastra (A.O.U., 1910, p. 292).

Anderson (1907, p. 299) lists this bird as a host of the Cowbird in Iowa. It should be remembered that he includes it on other than first-hand information, and that while it may be perfectly correct, until the reliability of his informant is ascertained, it should be dealt with as an indefinite, uncertain record. This is the only case I have come across.

Iridoprocne bicolor (Vieillot). Tree Swallow.

A very rare victim. Kumlien and Hollister (1903, p. 105) write of this bird in Wisconsin that, "Strange as it may seem, this species *often* becomes the foster-parent of the Cowbird." It is very hard to believe that the authors really meant *often* as this bird is not well suited for the Cowbird. In support of their claim, however, the following may be of interest. F. L. Grundtvig (translated by C. E. Faxon, Trans. Wis. Acad. Sci., X, p. 122) writes of having seen a female Cowbird looking into a nest hole of a Tree Swallow on May 28, and on July 19, of seeing thousands of young Tree Swallows and among them five young Cowbirds. If the Cowbird often parasitizes the Tree Swallow in Wisconsin, it would seem as though the latter bird must use shallower holes in which to nest in that state than in other places.

Riparia riparia riparia (Linn.). Bank Swallow.

Riparia riparia (A.O.U., 1910, p. 294).

Purely an accidental victim of the Cowbird. Mr. R. M. Barnes of Lacon, Illinois, writes me that he has in his collection a set of Bank Swallow, containing six eggs of its own and one of the Cowbird, taken by William E. Loucks. Probably the only way in which such a happening could take place would be in an abnormal nest, i.e., one that had been exposed, or else was very shallow.

Bombycilla cedrorum (Vieillot). Cedar Waxwing.

An uncommon victim. This is to be expected when we consider that this bird starts nesting after the laying season of the Cowbird is well past its height. There are cases on record from various places,—New York, Connecticut, and Montana. Aside from these few records there are no data available.

Phainopepla nitens (Swainson). Phainopepla.

Apparently a rare victim of the dwarf race of the Cowbird. I know of only one record. Strong (Oologist, XXXVI, 1919, p. 181) records a nest of this species with a Dwarf Cowbird's egg.

Vireosylva olivacea (Linn.). Red-eyed Vireo.

This bird is so frequently imposed upon that it is difficult to think of the Cowbird getting along without the pensile, cup-like nests of the Red-eye. No species suffers more and few as much. At Ithaca sixteen cases have been observed and I have data on hundreds of others.

Occasionally this Vireo covers over, or buries (under a new nest floor), the parasitic eggs as does the Yellow Warbler, but on the other hand it has been known to incubate Cowbirds' eggs even when none of its own were present, and almost always seems not to mind the strange eggs in the least. Three and four of the parasitic eggs are sometimes found in a single nest.

In no part of its range where Cowbirds are present is the Preacher Bird exempt from their molestation. The hundreds of records in my files range from Ontario, Montreal, New England, New York, New Jersey, Pennsylvania south to District of Columbia, Virginia, West Virginia, and Georgia (see under Geographic Distribution), and west to Ohio, Indiana, Michigan, Illinois, Minnesota, Iowa, and Texas.

Vireosylva flavoviridis (Cassin). Yellow-green Vireo.

A very poorly known victim. I have but a single record. Salvin and Godman (Biologia Centrali-Americana, Aves I, 1886, p. 451) list this bird as a victim of the Dwarf Cowbird.

Vireosylva gilva (Vieillot).

Two races of this Vireo are victimized by the Cowbird.

a. *Vireosylva gilva gilva* (Vieillot). Warbling Vireo.

A very common victim. At Ithaca I observed two cases, both of which were found after the young Cowbirds were out of the nests. The food given one young one by the Vireos in charge consisted of cutworms, mosquitoes (?), small Odonata, flies, and other unidentified insects.

In some localities this bird is imposed upon to a much greater extent than at Ithaca. Eaton lists the Warbling Vireo as one of the commonest molothrine victims in New York State, and I have numerous records from other parts of the country—Indiana, Illinois, Iowa, Wisconsin, Ohio, and Pennsylvania, in addition to the places mentioned above. All together over forty records have come to my notice.

In common with the other species of its family, this Vireo normally makes no attempt to rid herself of the parasitic eggs.

b. *Vireosylva gilva swainsoni* (Baird). Western Warbling Vireo.

Mrs. Margaret M. Nice of Norman, Oklahoma, writes me that Mr. R. C. Tate found two Cowbird's eggs in a nest of this species at Kenton, Cimarron County, Oklahoma. This is the only record I know of.

Coues (Birds of Colorado Valley, 1878, p. 513) hints in an indefinite way that this bird is victimized by the Cowbird.

Lanivireo flavifrons (Vieillot). Yellow-throated Vireo.

A common victim. At Ithaca I observed but one case, and as the Cowbird and this Vireo are common breeders there, it seems that the extent to which it is parasitized varies considerably geographically. Baird, Brewer, and Ridgway call the Yellow-throated Vireo a common nurse of the Cowbird in New England, and I have found some fifty cases distributed among the following states: New York, New Jersey, Connecticut, west to Illinois, Iowa, and Kansas, and south to Arkansas.

Occasionally this bird buries the Cowbird's egg in the lining of the nest if it has no eggs of its own at the time. (See Jacobs, Wilson Bull. X., 1903, p. 19.)

Lanivireo solitarius solitarius (Wilson). Blue-headed Vireo.

A rather uncommon victim. Eight definite records have come to my notice, two of which were found at Ithaca, both before my time.

Dr. A. A. Allen (Bird Lore, XV, 1913, pp. 296-300) outlines the history of the first case at Ithaca as follows:

On May 9, the nest contained one egg of the Cowbird and none of the Vireo. On May 10, the Cowbird egg was covered by a new floor. During the next five days the nest was not looked into as the bird was on it each time the place was visited. On May 15, the nest contained two more Cowbird's eggs and three Vireo's eggs. The Cowbird's eggs were removed and the next day the nest contained four Vireo's eggs.

Case number two at Ithaca was related by Miss J. Moesel (Bird Lore, XVIII, 1916, pp. 160-163). The Cowbird laid one egg before the Vireo had laid any. This egg was removed by Miss Moesel. The Vireo laid three eggs and then the Cowbird laid one which was also removed. Twenty days later the nest was visited and all that was found in it was a Cowbird fledgling. Apparently another Cowbird's egg had been laid in the meantime.

In case number one it was noted that the Vireo buried the first Cowbird egg. This habit seems to be stronger in this species than in any of the other Vireos, judging by the scant amount of data at hand. Greene, in Massachusetts (Wilson Quarterly, 1892, pp. 8-9) records a similar instance. The Blue-headed Vireo does not usually bury the Cowbird's egg, and none of the Vireos cover over the parasitic egg if it is deposited after they have laid some of their own.

Vireo atricapillus (Woodhouse). Black-capped Vireo.

Apparently an uncommonly imposed upon species. Six cases have come to my notice, five of them referring to the Dwarf Cowbird, and the sixth to the typical form, *M. ater ater.* Dr. Witmer Stone writes me that there is a set of eggs of this Vireo with a Dwarf Cowbird's egg in the collection of the Philadelphia Academy of Natural Sciences. It was collected in Comal County, Texas, May 24, 1888, by G. B. Benners, and consists of three eggs of the Vireo and one of the Cowbird. Davie (1889, p. 351) records a set taken at the same place by the same collector, June 5, 1888, containing three eggs of the owner and two of the Dwarf Cowbird. In the files of the Biological Survey are records of three nests of this Vireo, each with three eggs of the owner and two of the Dwarf Cowbird, all from Comal County, Texas, and all now in the collection of Mr. J. P. Norris, of Philadelphia.

Mrs. Margaret M. Nice writes me that Mr. T. R. Beard found a Cowbird's egg in a nest of a Black-capped Vireo at Sapulpa, Creek County, Oklahoma. This refers to *M. ater ater.*

Vireo griseus (Boddaert).

Two races of this species are known to be victimized by the Cowbird.

a. *Vireo griseus griseus* (Boddaert). White-eyed Vireo.

A fairly common victim, first recorded by Alexander Wilson. I have come across about twenty records ranging from Connecticut and Pennsylvania, west to Illinois and south to Virginia and Texas. Both the typical and the dwarf races of the Cowbird are known to parasitize this bird.

b. *Vireo griseous micrus* Nelson. Small White-eyed Vireo.

This race is commonly parasitized by the Dwarf Cowbird in southern Texas. Camp has found it to be a common victim in the lower Rio Grande Valley and R. W. Quillin reports it at San Antonio as one of the birds most frequently imposed upon.

Vireo huttoni huttoni Cassin. Hutton's Vireo.

A rare victim of the Dwarf Cowbird. I know of but one record (Hanna, 1928, p. 161), from California.

Vireo belli Audubon.

Two races of Bell's Vireo are parasitized by the Cowbird.

a. *Vireo belli belli* Audubon. Bell's Vireo.

A common victim of two races of the Cowbird (*M. a. ater* and *M. a. obscurus*). Dozens of definite records are in my files, ranging from Illinois, Iowa, and Nebraska to Oklahoma and Texas.

Attwater, in Bexar County, Texas (Auk, 1892, p. 237), writes that the ". . . . nest of Bell's Vireo is usually selected to deposit their egg (Cowbird's) in, it being a rare occurrence to find a Bell's Vireo's nest that does not contain one or more Dwarf Cowbird's eggs. In one case a nest of the Vireo in a thorn bush contained four Cowbird's eggs, with three others lying on the ground three feet below."

Lantz (Orn. and Ool., 1883, p. 95) says that as far as he has observed, ". . . . this Vireo always deserts her nest when the Cowbird invades it with her parasitic eggs." On the other hand, Bennett, in Iowa (Proc. Iowa Acad. of Sci., 1917, p. 286), records six victimized nests of this Vireo, of which four had only Cowbird eggs in them. Out of the six nests only one was stated definitely to be deserted and that one contained a Vireo's egg together with three of the Cowbird

R. W. Quillin writes me that at San Antonio, the Bell's Vireo is a very common victim of the Dwarf Cowbird. "This species will sometimes build another layer, or, rather, add a layer of lining, and cover up the eggs of the Cowbird. They must often push the foreign eggs from the nest, as I have seen many, many eggs of the Cowbird on the ground under a nest of this species. Yet the Bell's Vireo will hatch the eggs in the majority of cases."

b. *Vireo belli pusillus* (Coues). Least Vireo.

According to Bendire this bird is a very common victim of the Dwarf Cowbird in southern Arizona. He writes (1895, p. 442), "According to my observations, the Least Vireo seems to be oftener imposed upon, in southern Arizona at least, than any other bird. . . . .

"I found it almost impossible to obtain a full set of the eggs of the Least Vireo, nearly every nest containing one or two eggs of this parasite, and usually only one or two of its own, and the latter were frequently punctured."

Willet (Pacific Coast Avifauna, 7, 1912, p. 70) records this bird as a molothrine victim in the Pacific Slope region of southern California, and Hanna records it in the San Barnardine Valley of California. If the Arizona bird is really separable from the California one, then the Arizona records would refer to *Vireo belli arizonæ* Ridgway, and *pusillus* would hold only for the California records.

Mniotilta varia (Linn.). Black-and-white Warbler.

This aberrant warbler is a rather uncommon victim of the Cowbird, only a couple dozen definite instances having come to my notice. However, Kells (Ottawa Nat., 1902, p. 230) says of this bird that the, ". . . . cow-bird is one of its worst enemies." At Ithaca a nest was found on May 30, 1922, containing four eggs of the Warbler and one of the Cowbird (fig. 2, Plate XXI). Later I learned that the nest had been found some time earlier and then contained one egg of the Warbler and the Cowbird's. Three days after I found the nest it was washed away by heavy rains.

Morden (Auk, 1884, pp. 193-194) writes that he found a couple of young Cowbirds, fat and plump, in a nest of this bird, and entirely underneath them was a Cowbird's egg, and two young Warblers, the former addled and the latter nearly dead from starvation or suffocation or both.

The largest number of Cowbirds' eggs found in a single nest of this Warbler is five, together with three eggs of the owner. (Trippe, Am. Nat., 1868, pp. 171-172.)

Records range from Ontario and New York to Connecticut, Pennsylvania, and Illinois.

Protonotaria citrea (Bodd.). Prothonotary Warbler.

Because of its habit of nesting in holes, it is somewhat surprising to find that this dainty Warbler is locally rather frequently victimized by the Cowbird. No less than thirty-six definite records have rewarded my search in the literature, and in the J. P. Norris collection alone, out of seventy nests of this bird, eighteen contain eggs of the Cowbird. It is worthy of note that all of these eighteen victimized nests were collected within two weeks at Burlington, Iowa, where some thirty-five nests were taken.

If the Warbler would take to nesting in deeper holes it would undoubtedly free itself from one of its most serious enemies. Loucks (Bull. Ill. State Lab. Nat. Hist., IV, 1894, pp. 31-32) in his detailed study of the Prothonotary Warbler writes that, ". . . . it is not unusual to find one or more eggs of the Cowbird in a Prothonotary's nest." As many as four eggs of the Cowbird have been found in a single nest together with four of the Warbler's. There are several cases on record of double-storied nests of this bird, with a Cowbird's egg buried in the lower story. Such cases are, however, not common, and usually the Warbler seems to make no attempt to get rid of the strange eggs.

The records in my files are from Iowa, Illinois, and one from Delaware.

Limnothlypis swainsoni (Audubon). Swainson's Warbler.

Helinaia swainsoni (A.O.U., 1910, p. 305).

The only note on this poorly known bird that has come to my attention is the following observation by Albert J. Kirn, in Copan County, Oklahoma (Oologist, XXXV, 1918, pp. 97-98).

"During the season of 1917, six different nests were found in a strip of woods a mile long and a little over a quarter of a mile in width, built by at least four different pairs of birds; two held eggs, one with Cowbird's, two were deserted, one held a punctured egg of the owner, the other a Cowbird's and a punctured Warbler's egg and a broken Warbler's egg on the ground beneath. Three or four eggs are laid or if Cowbirds are present, and they usually are, one or two, sometimes three eggs are laid."

Even though, as Mr. Kirn says, Cowbirds' eggs are often present in nests of this bird, yet neither species probably plays an important rôle in the ecology of the other. Most of the range of *Limnothlypis* lies outside the breeding area of *Molothrus,* and the former is by no means common where the two overlap.

Helmitheros vermivorus (Gmelin). Worm-eating Warbler.

A rather uncommonly imposed upon species. Twenty-one definite records, and as many more indefinite ones, have come to my notice, ranging from Connecticut and Pennsylvania to Indiana and Iowa.

Ladd (Orn. and Ool., 1887, p. 110) writes of finding a nest with a young Cowbird nearly full fledged, also a Cowbird's egg which contained a partly formed, but decaying embryo, and five eggs of the Warbler. He removed the young Cowbird, and to quote his words, "It was remarkable how tenaciously this little female fought in defense of the miserable young Cowbird. She would actually light on my back, flap her wings and snap her beak while I was taking possession of her little fosterling and nest of curios."

Jacobs (Oologist, 1924, May, pp. 52-54) found eleven victimized nests in Greene County, Pennsylvania.

Vermivora pinus (Linn.). Blue-winged Warbler.

A somewhat uncommon victim. Twenty-six definite cases have come to my notice, the records ranging from Connecticut, New Jersey, and Pennsylvania, west to Ohio and Iowa, and south to Virginia and Missouri.

Bailey, in Virginia (1913, pp. 198-201), writes that, "The greatest imposition on a good-natured bird that I ever found was that of the Blue-winged Warbler . . . . having four eggs of the Cowbird in its nest and two eggs of the Warbler. As they were almost uniform as to size, shape, and color, I judged the eggs to be all from one bird."

At Cold Spring Harbor, Long Island, New York, in 1927, I found at least three pairs of Blue-winged Warblers feeding young Cowbirds.

One of the hybrids between this species and the next—the so-called Brewster's Warbler, *Vermivora leuchobronchialis*—has been victimized in at least one instance. Eames, in Connecticut (Auk, 1893, pp. 89-90), writes that, "Within a stone's throw . . . . a beautiful Brewster's Warbler spent the greater part of his time. The latter, after patient watching, revealed his mate, a Blue-winged Warbler, and a nest in course of construction. . . . . When seen again June 14, it contained four eggs, two of which were Cowbirds', which were removed."

Vermivora chrysoptera (Linn.). Golden-winged Warbler.

A very uncommon victim. J. A. Allen (Am. Nat., 1870, p. 576) records a nest of this Warbler, in Massachusetts, containing four eggs of its own and one of a Cowbird. P. R. Hoy (Auk, 1885, pp. 102-103), in Wisconsin, found a nest with four eggs and one egg of the Cowbird. Crosby (Auk, 1923, p. 103), at Rhinebeck, Dutchess County, New York records a nest of this Warbler, May 19, 1922, with five eggs of its own and one of the Cowbird.

I have only six definite records, but the species is listed as a molothrine victim by Bendire and by Short.

As many as four eggs of the Cowbird have been found in a single nest of this Warbler.

Vermivora luciæ (J. G. Cooper). Lucy's Warbler.

This Warbler is only rarely imposed upon by the dwarf race of the Cowbird, *M. ater obscurus.* Brewster (Bull. N.O.C., VII, 1882, p. 85), in reporting on a collection of birds from Arizona, records a young Lucy's Warbler, Tucson, Arizona, June 11, "Taken from a nest which also contained a young *Molothrus ater obscurus.*"

Bendire (1895, p. 442) lists Lucy's Warbler as a victim of the Dwarf Cowbird, probably on the basis of the above record.

Vermivora ruficapilla ruficapilla (Wilson). Nashville Warbler.

Vermivora rubricapilla rubricapilla (A.O.U., 1910, p. 307).

A decidedly uncommon victim. But four definite records are in my files. Samuels (Orn. and Ool. of New Eng., 1867, p. 216), quoting J. A. Allen's "Catalogue of the Birds of Springfield, Massachusetts," records a nest with three eggs of the Warbler and one of the Cowbird, in all of which the embryos were far advanced. Macoun (Cat. of Canadian Birds, 1909, p. 614) records a nest with two eggs of the Warbler and two of the Cowbird, June 1, 1899, near Ottawa. There is also a parasitized nest in the collection of Mr. A. C. Bent, and another in that of Mr. J. P. Norris.

Vermivora peregrina (Wilson). Tennessee Warbler.

A very rare victim. Dr. Oberholser lists it as a victim of the Cowbird, but does not give any exact data on the record. This is all I know in regard to this species. It is probably practically free from the Cowbird's molestation as its range does not coincide with that of the parasite's for any great extent.[1]

Compsothlypis americana (Linn.). Parula Warbler.

Two races of this bird are known to be victims of the Cowbird.

a. *Compsothlypis americana americana* (Linn.). Parula Warbler.

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[1] Since the above was written Brodkorb (Auk, April, 1926, p. 249) found a Tennessee Warbler feeding a young Cowbird recently out of the nest. This was at Duck Lake, Muskegon County, southwest Michigan, on July 12, 1923.

I have no records for this subspecies, but Dr. Oberholser lists it as a victim of the typical form of the Cowbird, *M. ater ater.*

b. *Compsothlypis americana pusilla* (Wilson). Northern Parula Warbler.
Compsothlypis americana usneæ Brewster (A.O.U., 1910, p. 309).

This bird is practically free from that greatest enemy of most of the warblers, the Cowbird. Occasionally, however, parasitic eggs are found in the dainty pensile nests of the Parula Warbler. Stone found a nest on May 26, 1892, at Cape May Point, New Jersey, containing three eggs of the Warbler and one of the Cowbird. he writes that, ". . . . how it (the Cowbird's egg) was deposited is somewhat of a mystery as the opening seemed entirely too small to admit the intruder." (Summer Birds of Pine Barrens of New Jersey, p. 138.)

Five other records have come to my notice, from Long Island, New York, Pennsylvania, and Connecticut, and this bird is listed as a victim of the Cowbird by several writers, as Bendire, Davie, and Chapman.

Dendroica æstiva (Gmelin).

Three races of this species are victimized by the Cowbird.

a. *Dendroica æstiva æstiva* (Gmelin). Yellow Warbler.

One of the very commonest victims. In regions where the Cowbird is common, comparatively few nests of the bird are unmolested.

The chief point of interest in this species lies in its method of getting rid of the parasitic eggs. Its habit of building a new floor to the nest in order to cover over the Cowbirds' eggs is well known, but before any explanation is offered it may be well to briefly review the known facts.

1. If a Cowbird's egg is deposited before the Warbler has laid any of its own, the strange egg is usually buried under a new floor, but not infrequently the nest is deserted.
2. If the Warbler has laid even one egg before the parasitic egg is introduced, the bird usually accepts and eventually incubates the strange egg along with its own. Sometimes, however, it buries the eggs, its own included, in an effort to get rid of the foreign egg. It may also desert the nest.
3. It sometimes happens that, after building a new floor to the nest, the Warbler is again parasitized. There is a great deal of variation in the reactions of the birds under these conditions. Usually if there are several eggs of their own in the nest, they accept the Cowbird's eggs and incubate. If the Cowbirds lay first, the Warblers may either desert or build a second new floor to the nest. There are numerous records of two-, three-, four-, and even five-storied nests of the Yellow Warbler, each of the lower stories containing eggs of the Cowbird, and in some, eggs of the Warbler as well. As many as four eggs of the Warbler have been found buried with one of the Cowbird, but such cases are very rare. It is quite uncommon to find more than one or two eggs of the Warbler thus covered over.

Other species occasionally build over the Cowbirds' eggs, but the Yellow Warbler is the only one that does so regularly. According to Hudson, a South American Flycatcher, *Sisopygis icterophrys,* seems to regularly cover up the eggs of the Shiny Cowbird, *Molothrus bonariensis,* in the same way.

The theories and explanations advanced to account for this habit of the Yellow Warbler are many, but only one is worthy of serious consideration. This theory, advanced by F. H. Herrick, carries with it a great degree of plausibility, and is logical, to say the least. Herrick studied the cyclical instincts of birds, i.e., migration, mating, nest-building, egg-laying, incubation, etc. He found that if the cycle was disturbed at any point, the birds would go back one stage in the cycle and start from that point. Thus, if the egg-laying stage was disturbed by some cause, the birds would go back one stage, i.e., to nest-building. They would build a new nest and then resume egg-laying. In the case of the Yellow Warbler, the egg-laying is disturbed by the introduction of a Cowbird's egg, and, according to the above idea, the Warbler should desert (as many birds do), and build another nest. However, reasons Herrick, the Yellow Warbler is so attached to its nesting site that it does not want to leave. At the same time instinct prompts it to build another nest. There is a struggle between two instinctive forces, the one tending to hold the bird to the nesting-site, the other trying to drag it away and build a new nest. The contest is a fairly even one, and the outcome not predictable in any one case. The presence of eggs of its own in the nest strengthens the attachment of the bird to the site and nest, and it is this instinct that wins in the majority of cases. The new floor, covering the parasitic eggs, is to be interpreted as comparable to a new nest, such as the sequence of the cyclical instinct would demand, but placed directly in or on the old one, due to the strong site attachment. As stated above, the presence of eggs of its own in the nest tends to make the contest more unfavorable to the cyclical sequence, and consequently we find that Cowbird eggs are frequently accepted if any Warbler's eggs are in the nest.

About 500 records have come to my notice, being distributed among the following states:—Maine, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, District of Columbia, Virginia, West Virginia, and Oklahoma, west to Ohio, Indiana, Illinois, Michigan, Minnesota, Iowa, the Dakotas, Nebraska, Colorado, Montana, and also in southeastern Canada.

b. *Dendroica æstiva sonorana* (Brewster). Sonora Yellow Warbler.

Apparently a fairly common victim of the Cowbird (*M. ater abscurus*), chiefly in Arizona. Published records are not numerous, but there is no reason to believe that the Cowbird acts differently towards different races of *Dendroica æstiva.*

c. *Dendroica æstiva brewsteri* (Grinnell). California Yellow Warbler.

An uncommon victim of the Dwarf Cowbird, as the latter is uncommon in the breeding range of this form. It is listed by Willet in southern California. Hanna (1928, p. 161), however, records 16 parasitized nests in Southern California.

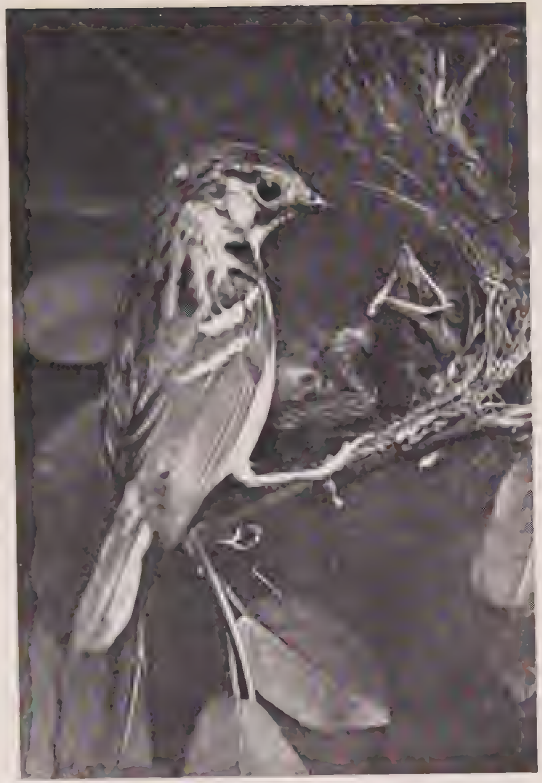
Dendroica cærulescens cærulescens (Gmelin). Black-throated Blue Warbler.

A decidedly uncommon victim. Very few records have been found. Hathaway, in Rhode Island, (Auk, 1913, p. 557), records seeing a female of this species feeding a young Cowbird much larger than herself. Kells (Ottawa Nat., 1902, p. 182) records two victimized nests. (Also in Orn. and Ool., 1887, pp. 76-77.) Bendire merely mentions this warbler in his list.

Dendroica coronata coronata (Linn.). Myrtle Warbler.

Dendroica coronata (A.O.U., 1910, p. 312).

A very rarely imposed upon species. Its breeding range overlaps that of the Cowbird in but few places, and this probably largely accounts for its freedom



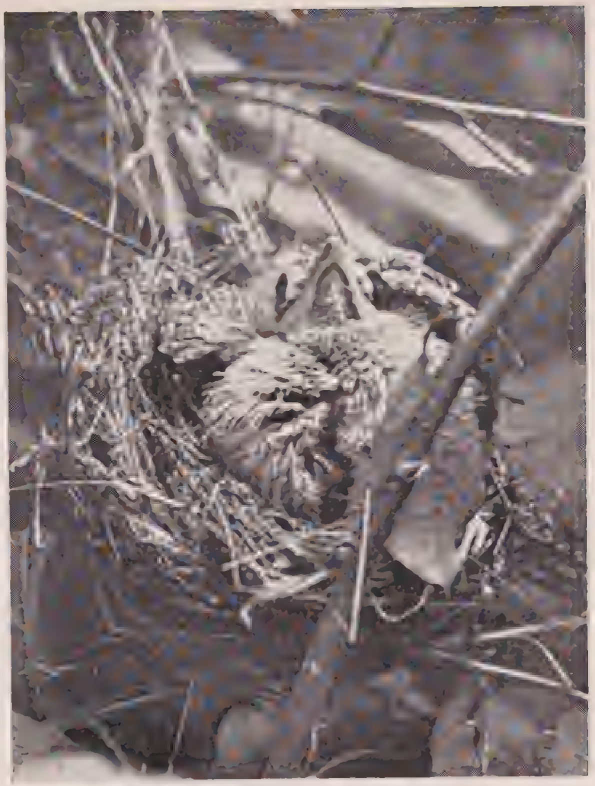


PLATE XXII.

CHESTNUT-SIDED WARBLER FEEDING YOUNG COWBIRD.

NINE-DAY OLD MOLOTHRUS ATER IN NEST OF CHESTNUT-SIDED WARBLER.

from molothrine molestation. Knight lists it as a victim of the Cowbird in Maine. (Birds of Maine, 1908, pp. 341-342), and Harrington (Ool., 1915, p. 99) records a nest in Ontario July 17, 1914, containing two eggs far advanced in incubation and one fresh egg of the Cowbird.

Van Tyne (Auk, XLI, No. 1, January, 1924, p. 169) records a nest of this Warbler June 20, 1919, near Hessel, Mackinaw County, Michigan, which contained a Cowbird egg and a Warbler egg.

Dendroica magnolia (Wilson). Magnolia Warbler.

Judging from the scarcity of published records, it would seem that this bird is a rather uncommon victim of the Cowbird. However, Eaton (Birds of New York, II, 1914, p. 410) says of this warbler:

"In some . . . . situations the Magnolia does not seem to occur, perhaps because it is so persecuted by the Red Squirrels and Cowbirds. The latter seems to make a specialty of presenting this Warbler with one or more of its eggs, generally puncturing the eggs of the Magnolia before leaving the nest."

Higgins (Nidiologist, 1894, p. 106) records a nest on June 6 with one egg of its own and one of the Cowbird. Another nest collected by Mr. Higgins at Cincinatus, New York, is now in the collection of R. M. Barnes of Lacon, Illinois. In the collection of the American Museum of Natural History at New York City, there is a Cowbird's egg taken from a Magnolia's nest. Mr. H. Mousley writes me that he found a Cowbird's egg in a nest of this species at Hatley, Quebec.

Dendroica cerulea (Wilson). Cerulean Wabler.

A very uncommon victim. I know of but four cases. W. E. Saunders (Auk, 1900, p. 361) records two afflicted nests in western Ontario, and Dickey (Ool., 1912, p. 302) found a parasitized nest in Greene County, Pennsylvania. Mr. A. C. Bent informs me that he has in his collection a nest of the Cerulean Warbler containing a Cowbird's egg.

Dendroica pensylvanica (Linn.). Chestnut-sided Warbler.

It is hard to understand how Bendire, in compiling his list, missed so common a victim as this. Numerous records were published prior to 1895, but nevertheless this warbler does not appear as a host of the Cowbird in his work. At Ithaca I found three parasitized nests, and in former years Dr. Allen has found many such cases. Over forty other records have come to my notice, ranging from Maine and Ontario south to New York and Connecticut, and west to Ohio, Michigan, Minnesota, and Nebraska.

Occasionally this species buries the Cowbirds' eggs if they have none of their own at the time. Sage and Bishop, in Connecticut, (1913, pp. 110-111), record such a case—a nest containing four eggs of the warbler, and one egg of the Cowbird buried beneath them. The nest had been watched for over a week previously, and the Cowbird's egg was known to have been laid before any of the warbler's. Mercer, (Ool. 1911, p. 77), also records a double-storied nest of this species.

The Cowbird is a very important enemy to this species, and a large number of them doubtless receive their early care at the expense of the Chestnut-sided Warbler.

Dendroica fusca (Muller). Blackburnian Warbler.

A very uncommon victim of the Cowbird. Audubon mentions it as a molothrine host, and Brewer, (writing in Baird, Brewer, and Ridgway, 1874, pp. 154-157), says, "I have found their (Cowbird) eggs in the nest of . . . . *Dendroica blackburniœ*. . . . ." Merriam (Auk, 1885, p. 103) records a nest in the lower Hudson Valley, New York, eighty-four feet from the ground, containing four warbler eggs and one of the Cowbird. This is probably the altitude record for a Cowbird's egg, bettering by some twenty feet my highest record at Ithaca, a Cowbird's egg in a nest of a Pine Warbler about sixty feet up. (See under Pine Warbler.)

Preston (Orn. and Ool., 1889, p. 35) records a nest with two fresh eggs of the owner and one of the Cowbird, and, ". . . . at the foot of the tree were fragments of two more eggs which had been crowded from the nest by this parasite." He also records another nest with three eggs, ". . . . with one of the inevitable Cowbird." This constitutes all the data I possess.

Dendroica dominica albilora Ridgway. Sycamore Warbler.

Mrs. Margaret M. Nice, of Norman Oklahoma, writes me that Mr. T. R. Beard found a Cowbird's egg in a nest of this species at Sapulpa, Creek County, Oklahoma. This is the only case I know of.

Dendroica chrysoparia Sclater and Salvin. Golden-cheeked Warbler.

Apparently a rather rare victim of the Dwarf Cowbird. Strong (Ool., 1919, p. 181) records a nest of the Golden-cheeked Warbler, June 6, 1894, at Fort Snell, Arizona, with three eggs of the owner and one of the Dwarf Cowbird. It is listed by Bendire, who gives no futher data. In the files of the Biological Survey at Washington, there is a note on two nests of this Warbler taken in Comal County, Texas, each containing an egg of the Dwarf Cowbird in addition to the rightful eggs. Both these sets are now in the collection of J. P. Norris, Jr. Brewster recorded a parasitized nest in southern Texas. Nothing more seems to be known of this bird in relation to the Cowbird.

Dendroica virens (Gmelin). Black-throated Green Warbler.

This warbler is very seldom bothered by the Cowbird. At Ithaca, on July 3, 1922, I watched a young Cowbird about one week out of the nest, being fed by a Black-throated Green Warbler.

This bird is listed by Bendire (1895, p. 436), by Baird, Brewer and Ridgway (1874, pp. 154-157), by Bicknell in the Catskill Mountains on the authority of John Burroughs (1882, p. 159), and by Chapman (1907, p. 33).

Dendroica kirtlandi (Baird). Kirtland's Warbler.

Although this species plays no great part in the economy of the Cowbird, the latter probably is a rather serious factor in the life of this warbler.

Barrows (Auk, pp. 116-117) writes of this bird in Iosco County, Michigan, as follows: "The single nest found contained one egg of the warbler and three eggs of the Cowbird, while a fourth Cowbird egg lay on the ground just outside the nest. Subsequently the warbler laid another egg and apparently removed one of the Cowbird's." Professor Barrows writes me that his ". . . . correspondence with several collectors indicates that this bird is frequently victimized; in fact, I believe the Cowbird is one of the most serious enemies of this species."

Strong (Ool., 1919, p. 181) records a nest May 31, 1908, Crawford County, Michigan, with two eggs of the warbler and two of the Cowbird.

Leopold (Auk, XLI, No. 1, January, 1924, p. 53) records a nest of this species with one young warbler and one young Cowbird. On the next day the nest contained two young birds and a new Cowbird egg. A little further in his paper (pp. 56-57) he goes on to say that in his opinion the Cowbird is a chief reason for the scarcity of this warbler.

Dendroica vigorsi vigorsi (Audubon). Pine Warbler.

Dendroica vigorsi (A.O.U., 1910, p. 318).

A rare victim. At Ithaca on June 29, 1921, I watched a Pine Warbler feeding a young Cowbird at the foot of a pine in which the nest was some sixty feet from the ground. As there was but one pair of Pine Warblers in the vicinity, and as I had previously heard Cowbird-like food cries from the upper part of this tree, I feel sure that the young Cowbird came from that nest. No young Pine Warblers ever appeared.

Eaton (Birds of N. Y., II, 1914, p. 429) records a nest on June 6, with three eggs and one of the Cowbird, one of the warbler's eggs being punctured. George Ord (1836, p. 59) records a nest in New Jersey, May, 1813, with three eggs of the warbler and two of the Cowbird. Wood, Smith, and Gates, in Cheboygan County, Michigan (1916, p. 14) record seeing a Pine Warbler feeding a young Cowbird.

Dendroica palmarum hypochrysea Ridgway. Yellow Palm Warbler.

A rare victim. Three records have come to my notice. Knight (Warbler, II, 1906, p. 6) records a nest near Pittsfield, Maine, with two eggs of the Warbler and two of the Cowbird. Strong (Ool., 1919, p. 181) found a nest at Penobscot, Maine, with two eggs of the owner and two of the Cowbird. Clayton (Ool., 1914, pp. 143-144) found a nest with two eggs of the Warbler and one of the Cowbird, which he removed. The next day there were three Warbler eggs and the female was setting.

Dendroica discolor (Vieillot). Prairie Warbler.

A very uncommon host. Ten records have come to my attention, ranging from Connecticut and New York, (Long Island), to District of Columbia and Virginia. The fact that this bird is so local in its breeding range may partly account for the comparative freedom it enjoys from the molestation of the Cowbird.

Seiurus aurocapillus (Linn). Oven-bird.

A very common victim. Over one hundred and fifty records are in my files. At Ithaca, the Oven-bird is rather rare summer resident, but the only two pairs I saw in the summer of 1921 each had a young Cowbird in their care. Dr. A. A. Allen tells me that in past years he has seen young Cowbirds cared for by Oven-birds on several occasions. As many as seven eggs of the parasite have been found in a single nest of this bird and Lynds Jones (Orn. and Ool., 1888, p. 133) says, "Never yet has a nest been found here but two or more Cowbird's eggs completed or completely made up the set. In one nest I found only three Cowbird's eggs nearly hatched; in another three of the Cowbird with one of Accentor; another contained four of Cowbird with two of the parent bird, and another . . . . just five Cowbird eggs."

Sage and Bishop, in Connecticut (1913, p. 160), write that eleven out of thirty nests examined contained eggs of the Cowbird.

The Oven-bird apparently never makes any attempt to get rid of the parasitic eggs in any way.

My records range from New England, New York, Connecticut, and Pennsylvania, west to Ohio, Indiana, Illinois, Michigan, Minnesota, and Iowa.

Seiurus noveboracensis (Gmelin)

Two races of this species are victims of the Cowbird.

a. *Seirurus noveboracensis noveboracensis* (Gmelin). Water-Thrush.

A rarely victimized bird. It is merely listed by Bendire, and by Chapman (1907, p. 33). Anderson (1907, p. 229) mentions it as a molothrine host in Iowa, and Short (1896, p. 14) in New York State. In Wayne County, Michigan (Bull. Mich. Orn. Club, I., 1897, p. 47), a nest was found on May 19 with three eggs of the owner and one of the Cowbird. "One egg of the Thrush had been ejected from the nest, probably the work of the Cowbird. The eggs were incubated."

The nesting habitat of this warbler is in itself sufficient to account for its freedom from the Cowbird.

b. *Seiurus noveboracensis notabilis* (Ridgway). Grinnell's Water-Thrush.

The only data I have on this race is the fact that it is listed by Oberholser as a victim of the typical form of the Cowbird, *M. ater ater.*

Seiurus motacilla (Vieillot). Louisiana Water-Thrush.

The degree to which this bird is victimized depends entirely on the local conditions in each area. In regions traversed by ravines and gorges with open country between them this bird is commonly affected, while in consistently, heavily wooded regions, it is quite free from molestation. Cowbirds do not penetrate far into forests, and in gorges the woods are usually rather narrow strips and so in such places woodland birds such as this Water-Thrush are parasitized.

At Ithaca I twice found young Cowbirds being fed by these birds, and Dr. Allen tells me that almost every nest he has found contained one or more eggs of the Cowbird. As the number examined by him is large, the statement has all the more force. Eaton (1914, p. 444) (quoting Clarence Stone) says of the Louisiana Water-Thrush:

"This warbler is much imposed upon by the Cowbird whose visits annually cause disaster by its clumsiness in filling the nest with loose shale or dirt while kicking two to three of the thrush's eggs out of the nest. In two instances I have noticed five eggs of the Louisiana Water-Thrush with two of the Cowbird; in two instances six of the Water-thrush and two of the Cowbird. Several times nests were deserted where the Cowbird had deposited her egg."

The only definite nest records I have are from New York, Connecticut and Pennsylvania, but it is listed as a molothrine victim in other places as well.

I have data on 55 victimized nests, as follows:
3 nests contained 4 eggs of the Cowbird each.
7 nests contained 3 eggs of the Cowbird each.
20 nests contained 2 eggs of the Cowbird each.
25 nests contained 1 egg of the Cowbird each.

Oporornis formosus (Wilson). Kentucky Warbler.

A common victim. Sixty-five records have come to my attention, ranging from Pennsylvania to Indiana, Illinois, and Kansas.

J. P. Norris, Jr., in Chester County, Pennsylvania (Orn. and Ool., 1889, pp. 104-106), found a nest on May 25 with one egg of the warbler and two of the Cowbird. He removed the Cowbird eggs and the warbler deserted and, according to his account, broke her own eggs also. Whether this last was accidental or not is not stated, but the impression the author doubtless wished to convey is that it was deliberately done.

In Greene County, Pennsylvania, the Kentucky Warbler seems to be the commonest victim of the Cowbird. Jacobs found eggs of the parasite in 47 nests of this warbler, as follows:
39 nests with 1 Cowbird egg each.
7 nests with 2 Cowbird eggs each.
1 nest with 3 Cowbird eggs each.
About one fifth of all nests found by him with Cowbirds' eggs were of this species.

Oporornis philadelphia (Wilson). Mourning Warbler.

A rarely recorded victim. At Ithaca, Dr. Allen has found a young Cowbird cared for by a Mourning Warbler, and believes that this bird is not an uncommon foster-parent of the Cowbird.

Barnes, (Ool. 1918, p. 109), records a set of this species containing three eggs of the owner and one of the Cowbird in his collection.

This is all the data I know of.

Oporornis tolmiei (J. K. Townsend). Macgillivray's Warbler.

A single record has come to my notice.

French, in southwestern Colorado (Condor, 1907, p. 156), ". . . . found an egg of *Molothrus ater* in a nest with two eggs of the Tolmie Warbler."

Geothlypis trichas (Linn).

Three races of this species are known to be affected by the Cowbird.

a. *Geothlypis trichas* (Swains). Maryland Yellow-throat.

The Maryland Yellow-throat is a very common victim of the Cowbird. At Ithaca five cases were observed by me, and, in previous years, many similar ones were noted by Dr. Allen and others.

By far the most detailed study that has ever been made of this bird as a foster-parent of the young Cowbird is Nelle E. Shaver's, "A Nest Study of the Maryland Yellow-throat", (Univ. of Iowa Studies in Nat. Hist., VIII, No. 2). In the nest studied by Shaver one Cowbird and two Yellow-throats were hatched, and one warbler egg was addled. A summary of all the feedings showed that the young

Cowbird got 55 per cent of the total amount of food, or 10 per cent more than the two young warblers together. A portion of the shell of the Cowbird's egg became adhered to one of the Yellow-throat's eggs, preventing the latter from hatching. "Thus 33⅓% mortality may be directly charged to the presence of the Cowbird. It will also be recalled that the Cowbird's egg hatched a day before any of the Yellow-throats' thus giving him a considerable advantage.

"The Cowbird was larger to begin with, and was able to lift his head higher when the old birds came with food . . . . the facts show that the Cowbird received 55% of all the food brought to the nest. He seldom was satisfied, and only a very few times did he fail to thrust his head forward for food. As he got older he acquired a habit of spreading his wings, and bringing them down over the Yellow-throats. Sometimes they retaliated by climbing on top of him. . . . the last entire day of feeding . . . . the old birds . . . . made a total of 348 visits to the nest with food. . . . . The Cowbird received all, or part, of the food on 190 of these visits."

It may be said that the above case is rather exceptional in that the two young warblers survived with the Cowbird. Usually they live but a day or two before they are starved or suffocated to death by the much larger Cowbird.

About sixty cases have come to my notice, ranging from New England, New York, Connecticut, and Pennsylvania, to Ohio, Indiana, Illinois, and Iowa.

Occasionally this species buries the Cowbird eggs. Weed and Dearborn record a three-storied nest, each of the lower two stories containing a Cowbird egg.

b. *Geothlypis trichas occidentalis* Brewster. Western Yellow-throat.

Apparently this form is imposed fairly often. Not many records have been found, but several writers claim that this bird is one of the most imposed upon species in their respective regions. The records range from Colorado to Utah. The Utah records probably refer to the Sage-brush Cowbird, *M. ater artemisiae.*

c. *Geothlypis trichas scirpicola.* Pacific Yellow-throat.
Geothlypis trichas arizela (A. O. U., 1910, p. 323).

But two records have come to my notice. Willet, in the Pacific Slope region of southern California, (Pac. Coast Avifauna No. 7, 1912, p. 70), mentions this race as a victim of the Dwarf Cowbird. Smith (Condor, XXVIII, September, 1926, p. 245) found a nest of this bird near San Jose, California, with 2 eggs of the Warbler and 1 of the Dwarf Cowbird.

Icteria virens (Linn).

Two races of the Chat are known to be victimized by the Cowbird.

a. *Icteria virens virens* (Linn.). Yellow-breasted Chat.

A very commonly imposed-upon species. At Ithaca Dr. Allen has on numerous occasions found deserted nests of this bird with eggs of the Cowbird in them. I have had no personal experience with them as molothrine hosts as Chats were not common during my time at Ithaca. About one hundred records, ranging from New England, Massachusetts, Connecticut, New York, and Pennsylvania, west to Iowa, and south to Virginia, Missouri, and Texas, have been accumulated. In many places this bird is said to be one of the worst sufferers from the Cowbird.

The eggs of the Chat are very similar to those of the Cowbird, but nevertheless the nest is almost invariably deserted if a parasitic egg is laid in it. This is doubtless due to the extreme shyness and nervousness of the Chat, rather than to any superior ability to distinguish the strange eggs from those of its own. Any one who has had much to do with Chats would hardly question the statement that it is perhaps the most timid of our birds and one of the most difficult to study. Nevertheless on at least two occasions Chats have hatched and reared Cowbirds, but these are exceptional cases. Nehrling (1896, vol. II., p. 245), records a nest in southwestern Missouri, in which, ". . . . three Cowbirds' eggs were found together with two of the rightful owners; one disappeared before hatching and so did the owner's eggs, while two Cowbird's eggs were hatched. At the age of three days one of the young parasites disappeared and only one was left in the nest of its foster parents."

Smith (Bird Lore, XXIII, 1921, pp. 175-177) has recorded some very interesting things in this connection. His observations were made in Birdcraft Sanctuary, where it seems the Chat has become unusually tame and quite fearless. He found a Chat's nest with one egg of its own and one of the Cowbirds. The next morning, ". . . . there was . . . . a second Cowbird's egg in the Chat's nest, from which the female Chat flushed at my approach. I visited this nest every morning. No more eggs were laid, and the Chat began incubation the same day the second Cowbird's egg appeared in the most. . . . . After several day's incubation I photographed the nest and eggs, and though I had to disturb the surroundings somewhat, she was on her nest as usual the next morning. All three eggs hatched, and it was the old story of crowding, and clamor, greed and starving, and though the young Chat managed to exist and leave the nest, it was 'out of sight' beneath the larger and stronger Cowbirds when I photographed the nest just before they left it.

"These Chats were completely deceived by the Cowbird and were as devoted to the alien interlopers as any other Warbler or Sparrow or Vireo would have been."

The same writer gives another instance of a Chat tolerating Cowbird eggs. Apparently there is considerable variation in the sensitiveness of Chats around their nests, but the bulk of the evidence goes to show that normally a Cowbird's egg has little chance of ever being hatched by a Yellow-breasted Chat.

Simmons (Birds, Austin Region, 1925, p. 172) lists this Chat as a victim of the Dwarf Cowbird.

b. *Icteria virens longicauda* Lawrence. Long-tailed Chat.

A rather infrequently reported victim. Cameron (Auk, 1908, pp. 50-51) records a parasitized nest in Montana, and Mr. R. M. Barnes writes me that he has in his collection a nest of this bird containing a Cowbird's egg.

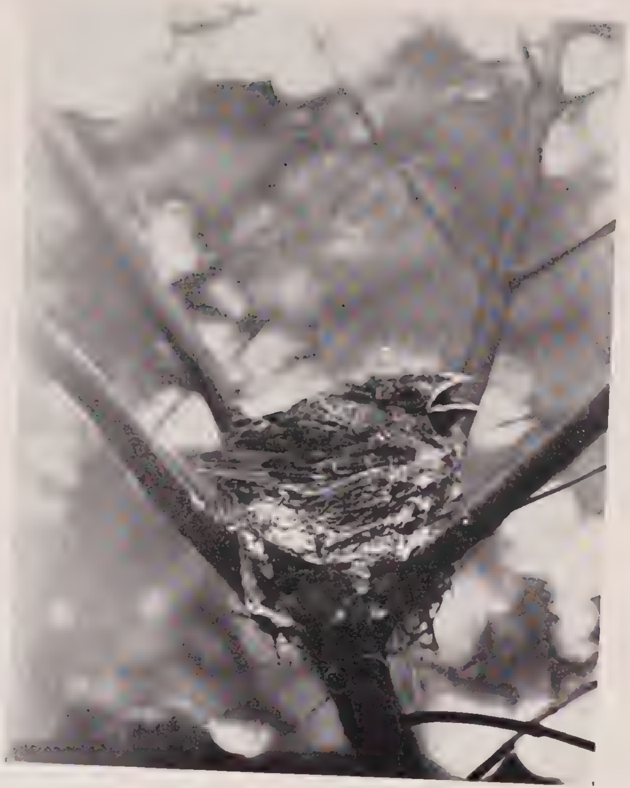
In the lower Rio Grande valley I found the Long-tailed Chat to be a common victim of the Dwarf Cowbird. Of four nests found, one contained two eggs of the owner and one of the Dwarf Cowbird, one contained three eggs of the Chat and one of the Cowbird, and the other two contained three Cowbirds' eggs apiece and none of the Chats (Auk, 1925, pp. 552-553).

Hanna (1928, p. 161) records five victimized nests in southern California.

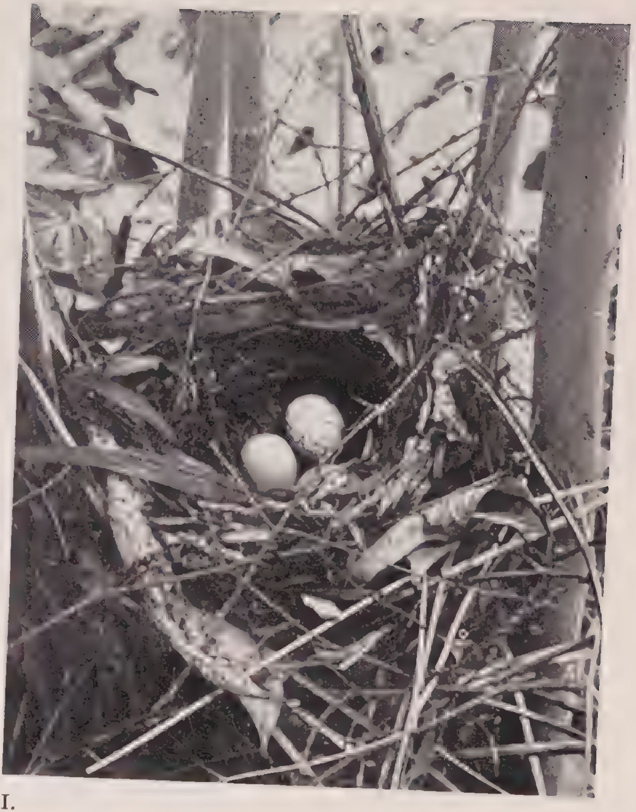
Wilsonia citrina (Boddaert). Hooded Warbler.

A rather uncommon victim. I have found ten records, distributed among the following states: Connecticut, New York, Virginia, and Michigan. In some localities the Cowbird seems to be a serious enemy of this species although nowhere does this Warbler play much of a part in the domestic affairs of the Cowbird.

PLATE XXIII.



Nine-Day-Old Cowbird (Molothrus ater) in Nest of Redstart (Setophaga ruticilla).



Nest of Veery (Hylocichla fuscescens), with Two Eggs of the Veery and One of the Cowbird (Molothrus ater ater).

Wilsonia pusilla chryseola Ridgway. Golden Pileolated Warbler.

A not uncommon victim of the Dwarf Cowbird in southern California. Willet, in the Pacific Slope region of southern California (Ventura County) (1912, p. 70), records a Cowbird's egg from each of three nests of this bird, and La Jeunesse (Condor 1923, pp. 31-32), in Alameda County, California, records five nests of this warbler, each containing one egg of the Cowbird. These last five nests were all found within a month in a small area, so that it seems that in some localities the Cowbird may make considerable use of the nests of this species.

Wilsonia canadensis (Linn). Canada Warbler.

A very uncommon victim. But four records have come to my notice, one from New York, one from Minnesota, and two from Ontario.

Setaphaga ruticilla (Linn). Redstart.

This warbler is one of the very commonest victims of the Cowbird. At Ithaca this bird was the most imposed upon species. No fewer than twenty-three out of thirty-four nests found contained one or more of the parasitic eggs, and it was not uncommon to find sets composed of but one or two of the rightful eggs, the rest being Cowbirds'. It was therefore surprising to find that published records were fewer for this bird than for many less common victims. Doubtless many observers felt that only cases of the more unusual victims deserved to be published, and for this reason probably a smaller percentage of the total number of victimized nests found has been recorded for the Redstart than for most other birds. About thirty records have come to my notice, but when we remember that at one locality, in two seasons, I have been able to record nearly as many, it can be readily seen that the number of published instances has little bearing on the number of victimized nests found. The records range from south-eastern Canada, Maine, Massachusetts, Connecticut, New York, New Jersey, and Pennsylvania, to Ohio, Michigan, and Iowa.

Occasionally the Redstart builds a new floor over the Cowbirds' eggs, if, as sometimes happens, the Cowbird lays first. Usually they do not seem to mind it however, but go on laying as if there were no strange egg present. It is very seldom that they desert on account of molothrine annoyance.

Mimus polyglottos (Linn).

Two races of this bird are known to be victimized.

a. *Mimus polyglottos polyglottos* (Linn.). Mockingbird.

A rarely imposed upon species. Plant, in Arkansas (Ool., 1919, p. 18), records a nest of this bird with an egg of the Cowbird. This is the only case I know of.

b. *Mimus polyglottos leucopterus* (Vigors). Western Mockingbird.

Bendire (1895, p. 442) lists the Mockingbird as a host of the Dwarf Cowbird. This must refer to the western race, *leucopterus*. An anonymous writer (Orn. and Ool., 1890, p. 58) also lists it as a victim of the Dwarf Cowbird.

Mrs. Margaret M. Nice writes me that Mr. T. R. Beard found a Cowbird's egg in a nest of a Western Mockingbird at Sulpulpa, Creek County, Oklahoma. There is some slight doubt as to the subspecies of the Mockingbird in Creek Country, but it is probably the present form.

Simmons (Birds of the Austin Region, 1925, p. 172) lists the Western Mockingbird as a victim of the Dwarf Cowbird.

Dumetella carolinensis (Linn). Catbird.

A very uncommon victim. As far as I know the Cowbird has never been definitely reported to be successful with this bird although Elder, (Bird Lore, 1921, p. 185), states in a rather indefinite way that he has known the Catbird to raise one or two of its own young along with a young Cowbird. Usually this species throws out the Cowbird's egg. At Ithaca, on May 31, 1921, I found a nest of the Catbird with four eggs in it and a smashed Cowbird's egg on the ground twenty feet from the nest. There were no other nests near by and it looked as though the Catbird was responsible, but of course I could not be sure.

Experiments were tried to see whether the Catbird could distinguish her own eggs from eggs of other species. House Sparrow and Chipping Sparrow eggs were placed in two Catbird's nests, and in each case both were ejected by the Catbird. In this connection Nuttall (1840, p. 105) says that, "On placing an egg of this bird (Cowbird) in a Catbird's nest it was almost instantly ejected."

Mr. A. C. Bent collected a set of Catbird's eggs in North Dakota, containing one egg of the Catbird and four of the Cowbird, apparently laid by two different Cowbirds. E. Van Winkle (Orn. and Ool., 1890, p. 48) records a nest containing four eggs of the Catbird and two of the Cowbird. Both of these are unusual cases however. Alfred Eastgate informs me that he has found this bird victimized by the Cowbird in North Dakota. The few published records range from Maine, New York and Pennsylvania to Indiana and North Dakota. In all of these places the Catbird is parasitized very infrequently, and may be called practically free from molothrine annoyance.

It is worthy of note that while the Catbird seems to know enough to distinguish between its own and other eggs and to get rid of the unwelcome additions to its nest, yet in some ways it is a most unadaptable and stupid bird at its nest. If a leaf is laid lightly over the nest, it does not seem to know enough to get rid of it but will sit on the leaf as though trying to incubate through it.

Toxostoma rufum (Linn). Brown Thrasher.

A decidedly uncommon victim of the Cowbird. This species is the largest passerine bird affected by the parasite, and is the largest bird definitely known to have hatched and reared a young Cowbird. (See note under Mourning Dove.)

J. A. Allen saw a female Brown Thrasher feeding a nearly full grown Cowbird in Western Iowa in 1868. Of this observation, Baird, Brewer, and Ridgway (1874) write, ". . . . a very interesting fact and the only evidence we now have that these birds (Cowbirds) are reared by birds of superior size. As far as I know, the late Dr. Allen's observation has remained unique to this day. If observers anywhere have seen young Cowbirds fed and cared for by Thrashers they should publish their notes.

Seven definite nest records have come to my notice, from the following states—Connecticut, Pennsylvania, Iowa, Nebraska, and North Dakota.

Toxostoma longirostre sennetti (Ridgw.). Sennett's Thrasher.

R. D. Camp informs me that he has found this bird to be victimized by the Dwarf Cowbird near Brownsville, Texas. (See Auk, 1925, p. 549.)

Toxostoma curvirostre (Swains.). Curve-billed Thrasher.

Near Brownsville, Texas, Mr. R. D. Camp has found this species to be imposed upon by the Dwarf Cowbird. (See Auk, 1925, p. 549).

Salpinctes obsoletus obsoletus (Say). Rock Wren.

A very rare victim. I know of only one case, recorded by Bendire, (1895, p. 437), who wrote as follows, "Mr. William G. Smith, formerly of Loveland, Colorado, writes me that he found a Cowbird's egg in a Rock Wren's nest, under a ledge of rock, fully two feet from the entrance, which was barely large enough for the Wren to squeeze through. . . . ."

Thryothrus ludovicianus ludovicianus (Latham). Carolina Wren.

A very uncommon victim. Dickey, in Washington County, southwestern Pennsylvania, (Ool. 1914, pp. 158-160), writes of this bird as follows: "If the repulsive Cowbird adds an egg of hers the wren often discontinues the laying of a full set of eggs and we usually find but three or four. . . . .

"Several nests of this species that I examined held eggs of the Cowbird. . . . . A nest found April 22, 1905, was built behind some overhanging sod, in a bank bordering a public road. . . . . The bird laid but three eggs when a Cowbird deposited one of hers. . . . . April 24, I found a nest built in a depression of the sod, at the base of an old apple sprout, which grew on a bank at the roadside. The female incubated three eggs of her own and one of the Cowbird's. Some years later two more nests of this wren, containing eggs of the Cowbird, came under my observation."

Mr. R. M. Barnes of Lacon, Illinois, writes me that he has in his collection a parasitized set of this wren.

Jacobs, (Oologist May 1924, p. 52-54), records a nest of this bird in Greene Co., Pa., with 2 eggs of the Cowbird.

All the above records have to do with the typical race of the Cowbird.

Simmons, (Birds of the Austin Region, 1915, p. 172), lists this wren as a victim of the Dwarf Cowbird.

Thryomanes bewickii (Audubon).

Thryomanes bewicki (A.O.U., 1910, p. 338).

Two races of this wren are parasitized.

a. *Thryomanes bewickii bewickii* (Audubon). Bewick's Wren.
Thryomanes bewicki bewicki (A.O.U., 1910, 1910, p. 338).

A rare victim. I know of but two cases.

Nehrling, (1893 vol. II., p. 244), writes, "I have found the egg of the Cowbird in the nest of Bewick's Wren, in one of the nesting boxes I had provided; the entrance hole was very small so that no Bluebird and not even the Tufted Titmouse could enter. Nevertheless the Cowbird deposited its egg in the nest."

Henninger, (Wilson Bull. IX, 1902, pp. 400-401), records a nest in southern Ohio with five eggs of the Wren and one of the Cowbird, all fresh.

b. *Thryomanes bewickii cryptus* Oberh. Texas Bewick's Wren.
Thryomanes bewicki cryptus (A.O.U., 1910, p. 339).

Mr. Roy W. Quillin, of San Antonio, writes me that in the summer of 1925 he collected two sets of eggs of the Texan Wren, both containing five eggs of the

Wren and one of the Cowbird. The Wrens were flushed in both cases. He had previously found Cowbirds' eggs in a number of nests of the Texas Wren, but they were deserted nests and rarely contained even one egg of the rightful owner. This Wren nests in the holes made by the Texas Woodpecker in fence posts. But all the nests which had been visited by Cowbirds were in holes which had been broken out, or otherwise enlarged so that the rim of the nest could be seen.

Troglodytes œdon (Vieillot).

Two races of the House Wren have been found to be victims of the Cowbird.

a. *Troglodytes œdon œdon* (Vieillot). House Wren.

A rarely imposed upon species. It is merely mentioned as a molothrine victim by Bendire and also by Davie, while Kells, (Auk 1885, p. 106), in Ontario, writes that during 1884 he found young Cowbirds in the nests of several species among which he lists the present one.

b. *Troglodytes œdon parkmani* Audubon. Western House Wren.

Mr. Alfred Eastgate writes me that he has found an egg of the Cowbird (subspecies *artemisiæ*) in a nest of this Wren in North Dakota. This is the only case I know of.

Certhia familiaris americana Bonaparte. Brown Creeper.

Kumlien and Hollister, (Birds of Wisconsin, 1903, p. 124), in writing of the Brown Creeper say that,—" . . . . J. N. Clark observed a pair of creepers feeding a young Cowbird, just from the nest, at Meridan, in late June, 1897." While the chances are greatly in favor of the supposition that the Cowbird was really raised by the Brown Creepers, still I have known of Cowbirds reared by Vireos to be fed by Redstarts while the true foster parents were seeking food. Because of this, and also by reason of the fact that most Creeper's nests would be almost inaccessible to the Cowbird, I have placed this species on the hypothetical list, although, as said before, it is very probably a real case of parasitism.

Sitta carolinensis cookei Oberholser. White-breasted Nuthatch.

Sitta carolinensis carolinensis Latham (A.O.U., 1910, p. 345).

This bird is rarely victimized as might be expected from its habit of nesting in holes. I know of but three cases. Reinecke, on the Niagara Frontier near Buffalo, records an egg of the Cowbird in a nest of this nuthatch, the nest being in a horizontal dry branch of a Linden, and about forty feet from the ground.

Harlow, in southern Center County, Pennsylvania, (Auk, 1912, p. 477), found a nest on May 16, 1910, with six fresh eggs of the owner and one of the Cowbird.

Jacobs, (1923, pp. 19-20), also records a victimized nest.

Bœolophus bicolor (Linn). Tufted Titmouse.

A rare victim.

In the fifth volume of the British Museum's Catalog of Birds' Eggs, Ogilvie-Grant records (p. 374) an egg of the Cowbird in a nest of the Tufted Titmouse.

Goelitz, (Ool. 1915, pp. 147-152), in Illinois, records two parasitized nests of this bird, one containing seven eggs of its own and one of the Cowbird, and the other, three eggs of the owner and two of the parasite.

This species is also mentioned in Bendire's list. The Cowbird involved is the typical form, *M. ater ater.*

Jacobs, (1923, pp. 19-20), records a nest of this bird with a Cowbird's egg.

Bæolophus atricristatus sennetti Ridgway. Sennett's Titmouse.

Simmons, (Birds of the Austin Region, 1925, p. 172), lists this bird as a local victim of the Dwarf Cowbird. I know of no other data on it.

Penthestes atricapillus atricapillus (Linn). Chickadee.

A very rarely imposed upon species. I know of only a single record.

Goelitz, (Ool. 1915, p. 152), records a nest of the Carolina Chickadee, May 8, 1915, with four eggs and one of the Cowbird. Dr. Oberholser tells me that this record, judging by locality (Ravina, Illinois), is almost positively the Black-capped Chickadee.

Psaltriparus minimus californicus Ridgway. California Bush-tit.

One record (Bradford, 1928, p. 45), Rincon, California.

Auriparus flaviceps (Sund). Verdin.

A poorly known victim of the Dwarf Cowbird. At Brownsville, Texas, I found five nests, three of which were empty, one contained four eggs of the Verdin and the other contained an egg of the Dwarf Cowbird in addition to four eggs of the owner. I noted (Auk, 1925, p. 554), that the entrance to this nest was considerably larger than in the others and thought it was probably enlarged by the Cowbird when laying in the nest.

Mr. Roy W. Quillin writes me that he has found eggs of the Cowbird in a few nests of the Verdin but the nests were always in rather bad condition and the portion forming the "neck" or entrance was torn away and the nests deserted. He suggests that in the case I found this may also have been the case, but all the eggs were fresh. However, it is always best and safest to make no assumptions, as I did, but record only the bare facts.

Regulus calendula calendula (Linn). Ruby-crowned Kinglet.

A very rare victim. I have come across but one record. Davie, (1889, p. 428), writes that, "Mr. Montague Chamberlain records a nest which was taken at Lennoxville, Quebec, May 15, 1882. . . . . It contained nine eggs, one of them a Cowbird's."

Polioptila cærulea (Linn).

Two races of this gnatcatcher have been found to be victimized.

a. *Polioptila cærulea cærulea* (Linn). Blue-gray Gnatcatcher.

A not uncommon victim, and in some places a fairly common one. Both Wilson and Audubon mention this bird as a molothrine host and since their time numerous writers have done likewise. It is listed by Baird, Brewer, and Ridgway, by Bendire, by Davie, by Savage and Anderson in Iowa, and others.

Occasionally this species covers over the strange eggs, if the latter are laid first. Spicer, in Goodrich, Michigan (Orn. and Ool., 1887, p. 38), writes that, "On May 17, 1886, I discovered a pair of Blue-gray Gnatcatchers building a nest on a horizontal limb of an oak tree, about thirty feet up. On May 28, I again visited the tree and found the birds had taken their departure, but as the nest appeared to be a very large one, I ascended the tree to obtain it, and on examining it found that a Cowbird had deposited an egg before . . . . the owners, and that they had put in more lining and covered it entirely over, and had then built up the sides of the nest about ¾ of an inch higher. . . . ."

The above records refer to the typical eastern Cowbird. Simmons (Birds of the Austin Region, 1925, p. 172) lists this Gnatcatcher as a victim of the Dwarf Cowbird.

b. *Polioptila cærulea obscura* Ridgway. Western Gnatcatcher.

This race, the western counterpart of the preceding bird, holds much the same relation to the Cowbird as does its more eastern representative. This form is parasitized by the two western forms of the Cowbird (subsp. *artemisiæ* and *obscurus*) while the eastern Gnatcatcher is affected chiefly by straight *ater ater*.

Lowe, (Auk 1917, p. 455), says that in Colorado the Cowbird is, " . . . . common and breeds regularly in Pueblo County, where the young may be seen yearly fed by Gnatcatchers. It is rather strange that I have never known them to lay their eggs in the nest of any other species though they doubtless do so."

Mailliard, (Condor 1914, p. 26), found a nest near Buena Vista Lake, California, with three eggs of the owner and one of the Dwarf Cowbird.

Willet, (Pacific Coast Avifauna 7, 1912, p. 70), lists this bird as a molothrine victim in southern California, and Hanna (1928, p. 161) records 2 victimized nests.

French, (Condor X, 1908, p. 148), records a nest on the Navajo Reservation in New Mexico, with two eggs of the Gnatcatcher and one of the Cowbird.

This constitutes all the data I have.

Polioptila plumbea (Baird). Plumbeous Gnatcatcher.

A rather rare victim of the Dwarf Cowbird. Bendire, (1895, p. 442), records a nest which he first observed on June 10, 1872, when it contained a single egg; on visiting it again on the 17th the female was sitting on a couple of Dwarf Cowbird eggs alone, "and on looking on the ground I found the remnants of three eggs which evidently had been thrown out."

Swarth, (Condor 1905, p. 79), in the Santa Rita Mountains, Arizona, found a young Dwarf Cowbird being fed by a Plumbeous Gnatcatcher not quite half its size. French, (Condor 1915, p. 88), found two eggs of the Cowbird in a nest of this species at Sacaton, Arizona. Hanna (1928, p. 161) lists a parasitized nest in southern California.

Hylocichla mustelina (Gmelin). Wood Thrush.

A common victim of the Cowbird. About fifty records have come to my notice, ranging from New England, Connecticut, New York, Pennsylvania, and Maryland, west to Ohio, Indiana, Illinois, Michigan, and Iowa, and south to West Virginia and Texas.

Iowa seems to be the region of greatest parasitism on this species as twenty of the fifty records come from that one state, but as more records are published this ratio will doubtless change. Green, at Des Moines, Iowa, writes (Orn. and Ool., 1887, p. 91), that one half of the nests of this Thrush found contain one or more Cowbirds' eggs, and that he has found as many as six of the parasitic eggs in a single nest with two of the Thrush's. Stoner, also in Iowa, (Ool. 1919, pp, 80-81), records twelve parasitized nests of this bird.

At Ithaca I found but a single victimized nest of the Wood Thrush, (out of about ten nests found), and this nest came to grief the day after I found it. When first seen it contained two eggs of the owner and one of the Cowbird. The next day it was empty and deserted.

Perry, (Bird Lore 1908, pp. 126-127), gives the history of a heavily parasitized nest as follows:—The nest was found at Sterling, Illinois, and contained one egg of the Thrush and one of the Cowbird. "The following day it was found that the Wood Thrush had laid another egg, and that there were three Cowbirds' eggs instead of one there, which proved to me that there were at least two Cowbirds using the nest instead of one, for two Cowbirds' eggs had been deposited in less than twenty-four hours." He removed the Cowbirds' eggs on June 5. On the 13th another Cowbird egg was found in the nest, but there had been no change in the number of the Thrush's eggs. On the 20th the nest was again visited, and one young Thrush was found, apparently two days old, but no traces of the other two eggs were seen. On the 25th the nest was visited again and another Cowbird egg was found and removed. On July 1st the nestling Wood Thrush left the nest.

Prof. Lynds Jones, of Oberlin College, Oberlin, Ohio, writes me that he has known the Wood Thrush to throw the Cowbird's egg out. This is certainly only an exceptional case as usually the foreign eggs are tolerated by the Thrush.

Langille, (1892, pp. 162-164), writes of having once seen a Wood Thrush sitting on a solitary egg of the Cowbird.

Simmons in Texas, (Auk, 1915, p. 331), records an egg of the Dwarf Cowbird in a nest of this species.

Hylocichla fuscescens (Stephens).

Two races of this bird are victims of the Cowbird.

a. *Hylocichla fuscescens fuscescens* (Stephens). Veery.

A common victim; more so in some places than in others. At Ithaca, out of some thirty nests found, seven were parasitized. About twenty other records have come to my notice, ranging from Montreal, Maine, Connecticut, and New York, west to Illinois and Michigan. As far as I know two is the largest number of Cowbirds' eggs ever found in a single nest of this species. This bird makes no attempt to get rid of the parasitic eggs foisted upon it and usually incubates and rears the young interlopers.

b. *Hylocichla fuscescens salicicola* Ridgway. Willow Thrush.

A poorly known victim of the northwestern form of the Cowbird, *M. ater artemisiœ.* I have three records in my files, all previously unpublished. Mr. S. S. S. Stansell of Edmonton, Alberta, writes me that he has found Cowbirds' eggs in a nest of this bird at Edmonton. Mr. Alfred Eastgate informs me that he found a Cowbird's egg in a nest of Willow Thrush in North Dakota. Mr. R. M. Barnes has in his collection a set of this bird containing a Cowbird's egg collected at Hallock, Minnesota, June 24, 1898, by Rev. P. B. Peabody.

Hylocichla ustulata (Nuttall).

Two races of this bird are parasitized.

a. *Hylocichla ustulata ustulata* (Nuttall). Russet-backed Thrush.

One record. Smith (Condor, XXVIII, 1926, p. 245) found a nest of this thrush near San Jose, California, with two eggs of the owner and one of the Dwarf Cowbird.

b. *Hylocichla ustulata swainsoni* (Tschudi). Olive-backed Thrush.

An uncommon victim. Five cases have come to my notice.

Horsbrugh, in Alberta (Ibis. 1918, p. 495), records two parasitized nests, and in the same region, Stansell (Bird Lore, 1907, p. 120) records another.

Swales (Orn. and Ool., 1893, pp. 100-101) records two nests of this thrush with four eggs and one of the Cowbird, in Michigan.

Hylocichla guttata (Pallas).

Two races of this bird are affected by the Cowbird.

a. *Hylocichla guttata auduboni* (Baird). Audubon's Hermit Thrush.

A rare victim. It is listed by Bendire in his great work as a molothrine host. The only definite nest record I have is a nest with three eggs of the owner and one of the Cowbird, *(artemisæ),* taken in Valley, Utah, June 12, 1912, and now in the collection of Mr. R. M. Barnes to whom I am indebted for these data.

b. *Hylocichla guttata faxoni* (Bangs and Penard). Hermit Thrush.
Hylocichla guttata pallasi (Cabanis). (A.O.U., 1910, p. 362).

A very uncommon victim. I have found but six definite records.

Wintle, (Birds of Montreal, 1896, p. 90), records a victimized nest near Montreal; Swales, (Ool. 1892, p. 45), writes of one in Michigan; Short, (Ool. 1894, pp. 255-256), tells of a similar case in New York; and Burtch, (Ool. 1910, p. 139), records two nests of this Thrush, each with a Cowbird egg, also in New York State.

I have found one other record which unfortunately lacks both date and locality.

Turdus migratorius migratorius (Linn.). Robin.
Planesticus migratorius migratorius (A.O.U., 1910, p. 363).

Probably an uncommon victim. It is hard to state definitely the extent to which this bird is affected by the Cowbird because the parasitic eggs are practically always thrown out. Half a dozen or more records from New Nork, Connecticut, Iowa, North Dakota, and Alberta have come to my notice.

At Ithaca I watched a Cowbird lay an egg in a Robin's nest. (See under discussion of Egg-Laying.) The Robin drove the Cowbird off the nest just as she finished laying the egg. To quote from my field notes—" . . . . one of the old Robins came back to the nest after chasing the Cowbird some distance, looked in, gave two syllables of its distress call, and then drove its bill through the Cowbird egg and with a jerk of its head threw the egg out. . . . . The Robin gave a few more syllables of its distress call but not as loud as before and then settled on the nest. . . . ."

Experiments were made to see whether the Robin detected the strange eggs from her own by differences in color or size or both and it was found that color was the chief factor. Chipping Sparrow eggs, which are even smaller than Cowbirds', were accepted by the Robin, while larger eggs, more nearly approximating in size those of its own, but not as similar in color, were rejected.

Although Cowbird eggs are not tolerated by Robins, on one occasion I put two very young Cowbirds in a Robin's nest which contained only eggs at the time. The Robins stopped incubating their own eggs and took care of and reared the young Cowbirds. On one occasion I chanced to pass the nest when the Cowbirds were about seven days old, and found that about two inches of the tail of a very small garter snake was protruding from the bill of one of the Cowbirds. The bird finally swallowed and digested the snake!

The Rev. J. Walton, (Ool. 1879, p. 78), records seeing a female Robin sitting on a nest which proved to contain three eggs of the Robin and one of the Cowbird.

Sialia sialis sialis (Linn). Bluebird.

A very uncommon victim. About fifteen cases have come to my notice, being distributed geographically from Quebec, Massachusetts, Connecticut, New York and Pennsylvania, west to Iowa and Michigan and south to District of Columbia and Oklahoma, and Texas.

At Ithaca, a female Cowbird was seen to climb all over a bird box used by a pair of Bluebirds. It looked inside several times, and while it did not enter, it seemed very much interested in the box. A week later the same bird tried to get in the box but the male Bluebird chased it away.

Mrs. Margaret M. Nice of Norman, Oklahoma, writes that she found Cowbird eggs twice in nests in tree holes, and once in a nest box.

Forbush, in Massachusetts, writes me that "the only hole-nesting bird that I have known to be a host of the Cowbird is the Bluebird."

Richmond, (Auk 1888, pp. 21-22), records two Cowbird's eggs in a nest of the Bluebird at Washington, D.C.

Simmons, (Birds, Austin Region, 1925, p. 172), lists the Bluebird as a victim of the Dwarf Cowbird at Austin, Texas. All the rest of the above records refer to the typical, eastern *M. ater ater.*

Sialia mexicana bairdi Ridgway. Chestnut-backed Bluebird.

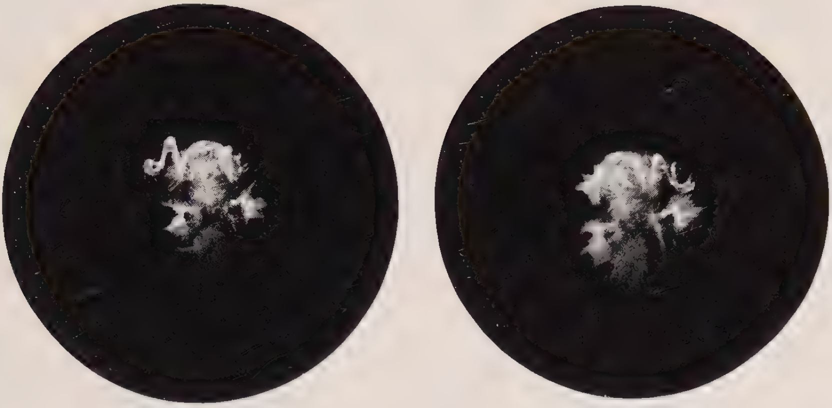
A very rare victim. This is doubtless the bird that Bendire meant when he mentioned the Western Bluebird as a victim of the Dwarf Cowbird. I am indebted to Dr. Oberholser for this correction of Bendire's list. This is all the data I know of.

The Young Cowbird

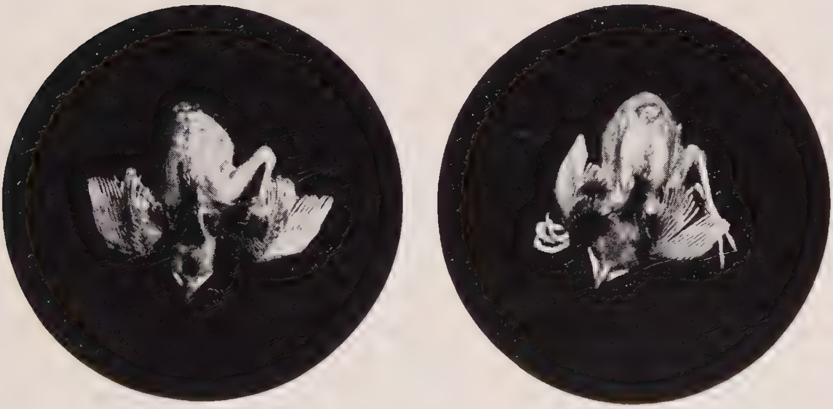
Almost nothing has been written concerning the young Cowbird, and the little that has found its way into print consists of scattered notes—fragments, which, when pieced together, give a very imperfect mosaic of the early life of the bird. Most accounts give no description of the development and nest-life of the young other than casual mention of the various foster-parents seen caring for them. A few notes dealing with the food of the young parasites in different nests have been found but taken all in all there is probably less published on this phase of the birds' history than on any other.

The Young in the Nest. In as much as the life of a young bird is very different after leaving the nest from its nest-life it is better that we treat of the two separately. The order followed here is the natural sequence.

Hatching of the Cowbird and Physical Development. I have not yet witnessed the actual hatching, but have found, on one occasion, a young



1. Two days old. 2. Two days old.



3. Six days old. 4. Seven days old.

PLATE XXIV.

Young Molothrus ater ater.

Cowbird apparently just hatched as it was not yet perfectly dry and the membranes in the broken shell were still moist with the amniotic fluid.

This Cowbird, probably less than an hour old, weighed 2.5 grams. The feet, i.e., the tarsus and toes, were light orange; the claws light yellow; the eye skin bluish-gray with a green-yellow slit; the bill was dusky lemon, 9.5 mm. wide at the base; length of culmen 4.75 mm.; the egg-tooth was 1 mm. high and wide like a blunt, equilateral pyramid; the corners of the mouth were slightly swollen and were white with the hind edge blood red, the whole being red internally; the skin was light orange with a slight pinkish tinge, very thin and transparent on the middle of the abdomen; the neossoptiles were a dirty grayish varying in length from 9 to 11 mm., being shortest on the uropygial and post-occipital pterylae. There was no indication of the abdominal, interscapular, neck, and crural pterylae; the alar tract did not extend beyond the carpus, while the femoral, dorsal, and supra-orbital pterylae were prominent. The uropygial and posterior occipital tracts were very small and, as stated above, had the shortest neossoptiles. The interior of the mouth was as follows:—roof—yellowish-orange with a median reddish area extending from the tip of the bill to, and including, the glottis; floor—yellowish-orange; margins of the gape—red; tongue—red with hind edge light yellow. Within a few days the yellowish-orange comes to be replaced with reddish, probably due to an increase of the blood supply. It should be understood that the feather tracts are indicated only by neossoptiles, no contour feathers being indicated as yet. The description of the down was made after the bird had dried and the feathers assumed their normal aspect.

During the first day of its post-embryonic existence the Cowbird changes only in weight, usually almost doubling in weight in the first twenty-four hours. The average weight of a day old Cowbird is 4.5 grams. At the end of the first day there is still no interscapular tract, nor any down to mark its future position. By the end of the second day the down has grown considerably where present, the ventral or abdominal, and neck tracts are beginning to show through the skin, a few neossoptiles have sprouted at the lower end of the shanks indicating for the first time the crural tracts; the secondaries, tertials, and their upper coverts have prominent down, and the sheaths of the four outermost primaries are beginning to break through the skin. At the end of the second day the young Cowbird may weigh from 7.5 to 8.5 grams.

By the end of the third day the sheaths of all the primaries, secondaries and tertials have pierced the skin; the crural tract has not grown noticeably in size; and the interscapulars have become visible through the skin although they have not yet pierced it. The eye is still covered over but is greatly reduced in size. There is a great increase in the size and weight of the bird on this day, but this varies somewhat with different species of foster-parents, and with different individuals with the same species of nurse, and will be treated separately.

On the fourth day the eyes usually begin to open. The opening is rather slow, and it is sometimes not until the fifth day that they are fully open, although they usually are so by the end of the fourth. Contour feathers have sprouted in all but the head, abdominal, crural, and uropygial pterylae but the down is still persistent. The under wing-coverts have sprouted, (contour feathers), and the interscapulars have come through the skin and are continuous with the dorsal and neck pterylae. There is very little down on the crural and uropygial tracts, and few contour feathers have sprouted on the femoral tracts.

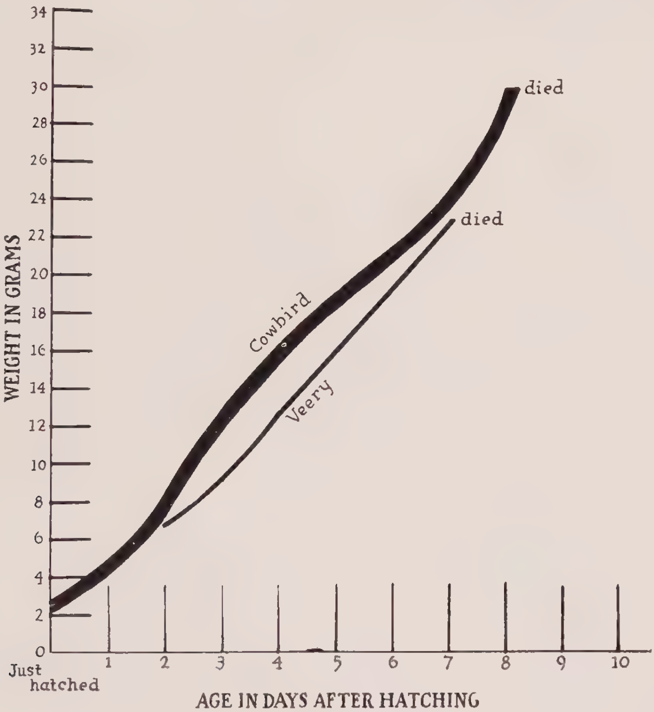


FIG. 9.
RATE OF DAILY GROWTH OF YOUNG COWBIRD AND YOUNG
Heavy line—young Cowbird.
Solid line—young Cowbird.
Light line—young Veery.

On the fifth day there is again a great increase in size and weight. Contour feather sheaths appear on the abdominal and cural pterylae and become more numerous and larger on the femoral tracts. The sheaths of the rectrices of the tail begin to show; the egg-tooth is still present, and the tarsal envelope is sufficiently hard to show the scutellate acrotarsium.

On the sixth day the sheaths of the wing feathers begin to open, and those of the other tracts are considerably larger than on the previous day. The egg-tooth is no longer very distinct in shape.

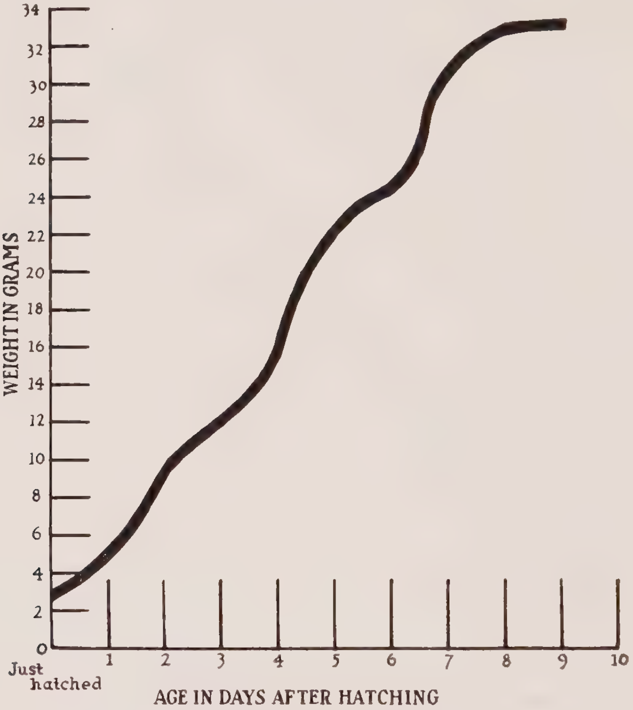


FIG. 10.
RATE OF DAILY GROWTH OF YOUNG COWBIRD IN NEST OF CHESTNUT-SIDED WARBLER (*Dendroica pensylvanica*).

On the seventh day the sheaths of the other tracts, with the exception of those on the forehead, begin to open and all are again larger than on the sixth day.

On the eighth day all of the sheaths except those of the forehead are partly opened. Those on the forehead may begin to open on this day, but usually they are only slightly opened at the time when the bird leaves the nest.

By the ninth day the feathers have grown considerably but bare spaces are still visible between the feather tracts especially on the venter. If frightened the birds may leave the nest on this day, and often do so without any such stimulus. They can fly a little, but are still easily caught.

By the tenth day they usually leave the nest although bare spaces still show through between the feathers of the abdomen and some down still quivers at the distal ends of some of the head feathers. The flight feathers are not entirely free from their sheaths on this day but nevertheless the young leave the nest. The space around the eyes and also the chin are still bare and the tail very small and short. The underparts have the streaks of the juvenal plumage quite imperfectly developed and not nearly as prominent as they later become as these feathers grow.

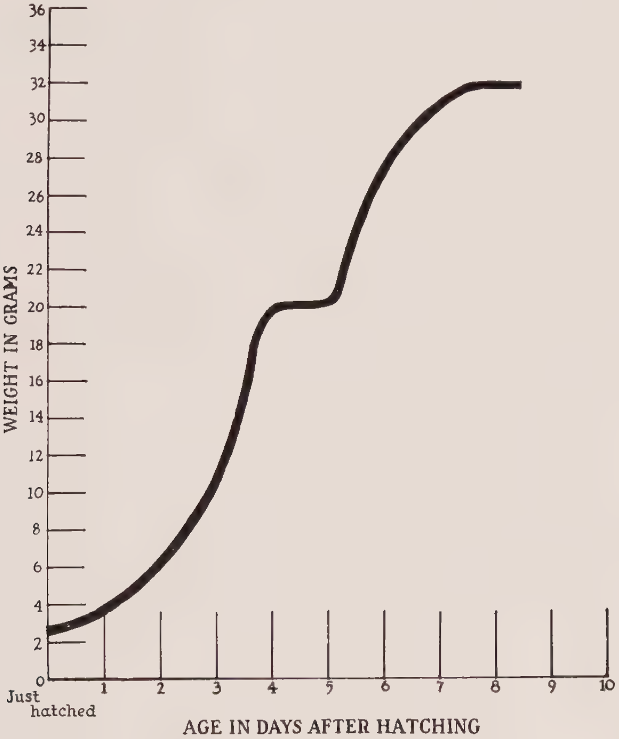


FIG. 11.
RATE OF DAILY GROWTH OF TWO YOUNG COWBIRDS IN NEST OF RED-EYED VIREO (*Vireosylva olivacea*).

Rate of Daily Growth. The daily rate of growth varies considerably both with the species of foster-parent and individually. I have not sufficient data to determine whether or not there is a constant difference in this respect between various species of hosts but it seems as though the host factor plays some part in the rate of growth of the young Cowbird. If the young Cowbird is the sole occupant of a nest its growth tends to be more rapid than in nests where it meets competition from some of the rightful young or from another Cowbird. However, this does not always hold, and it is somewhat surprising to find that two young Cowbirds may be raised by a bird as small as a Vireo and each grow as rapidly as a lone Cowbird would in another nest of a Vireo or other small bird. The faster-parents have to work harder in one case than in another.

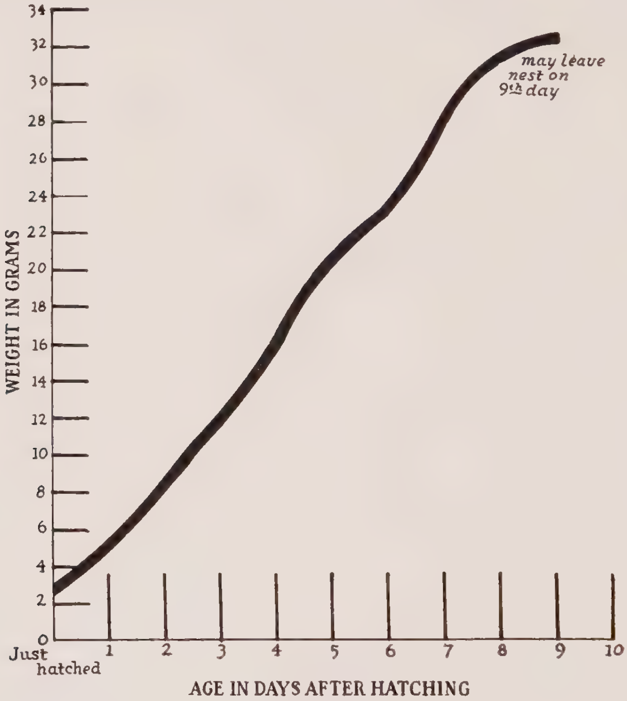


FIG. 12.
AVERAGE RATE OF DAILY GROWTH OF YOUNG COWBIRD.

The rate of growth may be best illustrated graphically as is done in the accompanying graphs. (Figures 9-12.) For the first two days, the daily increase is close to 100 per cent, but from then on the rate is slower, averaging about 50 per cent on the third day and gradually lessening until it comes to be about 10 per cent on the eighth day and only 5.5 per cent on the ninth. When the Cowbird leaves the nest it averages about 33 grams or approximately 13 times its weight on hatching.

The question of growth is largely a matter of food and this leads us to a consideration of the food given the young Cowbird by the various species that act as its foster-parents.

Food of the Young Cowbird. It may be said at the outset that birds give the young Cowbird exactly the same food that they normally give their own young. Thus the Cowbird as a species probably samples a larger variety of food substances than any other bird in this country. Of the more than 190 kinds of birds known to be victimized, half (91, to be exact) have been definitely known to rear the young parasites. This means that the food materials normally used by the young of at least 91 different species of birds have been fed to young Cowbirds. This entails no little amount of adaptability to various diets on the part of the nestling and at times must sorely tax it. However, in the great majority of cases, birds quite different in their food habits as adults, feed their young on very similar diets. Practically all seed-eating and graminivorous birds as well as insectivorous species feed their young on an insect diet. To this some add fruit, as the Waxwing and Robin for example, others tempt their nestlings with worms as does the Robin; a few regurgitate partly digested seed pulp into the throats of their offspring—the Goldfinch is such a one. To all of these and occasionally to other and unusual kinds of nutriment the young Cowbird responds with equal vigor and apparently survives them all equally well. A parasite cannot afford to be particular in its choice of food.

A detailed analysis of the food of young Cowbirds follows. For much of this data I am indebted to Mr. W. L. McAtee who sent me a copy of the results of fourteen stomach examinations of nestling Cowbirds. (See Condor, 1911, p. 107, for Mr. McAtee's summary of these examinations.) Mr. McAtee's results follow:

No. 1 Male. Locality: Englewood, N.J. Date: June 13, 1886. Hour: 4:30 P.M. Collector: F. M. Chapman. From nest of *Geothlypis trichas.* Condition of stomach: Well filled. Percentage of animal matter: 100; of vegetable, tr.; of gravel, etc., 1. Contents: 1 Diptera, 10%; 2 Bibio larvæ, 10%; caterpillars, 40%; spider with cocoon and eggs, 40%. Trace of Setaria. Some vegetable matter from stomachs of caterpillars.

No. 2. Female. Locality: Beaver, Pa. Where killed: Orchard. Date: July 1, 1891. Hour: 5 P.M. Collector: W. E. Clyde Todd. Being fed by Baltimore Oriole which had been on a cherry tree. Condition of stomach: Well filled. Percentage of animal matter, 100; of vegetable, —; of gravel, etc., 2. Contents: Grasshoppers, 83%; caterpillars, 10%; spider, 8%; minute bit of egg shell.

No. 3. Female. Locality: Beaver Dam, Wis. Where killed: Grove, lake shore. Date: July 8, 1899. Hour: 10 A.M. Collector: W. E. Snyder. Being fed by *Melospiza m. melodia.* Condition of stomach: Well filled. Percentage of animal matter, 99, of vegetable, 1. Contents: Remains of weevils, 25%; bits of grasshoppers, 20%; larvæ of Ephemeridæ, 24%; seeds of Rumex, 1%; snail shell, 20%.

No. 4. Female. Locality: Beaver Dam, Wis. Where killed: Brush in woods. Date: July 4, 1901. Hour: 2 P.M. Collector: W. E. Snyder. Foster parent: *Vireosylva olivaceus*. Condition of stomach: Full. Percentage of animal matter, 100. Contents: Remains of 11 Acridiidæ—among them a Lubber grasshopper with 20 eggs, 55%; 1 Pentatomid with 100 or more eggs, 25%; remains of several spiders, 20%.

No. 5. Female. Locality: Beaver Dam, Wis. Where killed: Timber. Date: July 7, 1901. Hour: Early A.M.. Collector: W. E. Snyder. Foster parent: *Melospiza m. melodia*. Condition of stomach: ⅓ full. Percentage of animal matter, 95; of vegetable, 5. Contents: 1 Elaterid, 20%; 1 *Microrhopala porcata* and four other Chrysomelidæ, 20%; 3 Carabidæ, 30%; 6 small hymenoptera, 25%; 1 seed of *Chœtochloa glauca* and 1 of *Polygonum aviculare*, 5%.

No. 6. Male. Locality: Beaver Dam, Wis. Date: July 4, 1901. Hour 7 A.M. Collector: W. E. Snyder. From nest of *Pooectes gramineus*. Condition of stomach: Full. Percentage of animal matter, 100. 1 *Nephelodes violans* and 2 other caterpillars, 59%; 1 Lycosid with egg sac, 16%; 2 or 3 grasshoppers, 10%; and many fragments of egg shell enough to represent an entire egg, 15%.

No. 7. Female. Locality: Beaver Dam, Wis. Date: July 4, 1901. Hour: 7 A.M. Collector: W. E. Snyder. From nest of *Pooecetes gramineus*. Condition of stomach: ⅓ full. Percentage of animal matter, 100. Contents: Remains of 2 Acridiidæ, 15%; 1 *Nephelodes violans* and 5 other caterpillars, 60%; many fragments of egg shell, 25%.

No. 8. Male. Locality: Beaver Dam, Wis. Where killed: Timber. Date: July 7, 1901. Hour: Early A.M. Collector: W. E. Snyder. Foster parent: *Vireo gilva*. Conditions of stomach: Full. Percentage of animal matter, 95; of vegetable, 5. Contents: 1 white grub, 18%; remains of 1 Hemiptera, 50%; Hymenoptera, 27%; 1 bud, 50%.

No. 9. Male. Locality: Beaver Dam, Wis. Where killed; Timber. Date: July 7, 1901. Hour: Early A.M. Collector: W. E. Snyder. Foster parent: *Vireosylva olivaceus*. Condition of stomach: Full. Percentage of animal matter, 100. Contents: Remains of 1 Cicada, 48%; 1 Dragonfly, 40%; and 2 spiders, 12%.

No. 10. Male. Locality: Beaver Dam, Wis. Where killed: Along a rail fence. Date: July 7, 1901. Hour: Early A.M. Collector: W. E. Snyder. Foster parent: *Dendroica æstiva*. Condition of stomach: Full. Percentage of animal matter, 100. Contents: Remains of 2 *Euschistus* sp., 38%; 1 Chrysomelid, 1%; about 3 moths and 2 caterpillars, 60%; and 1 Acridiid, 1%.

No. 11. Female. Locality: Beaver Dam, Wis Where killed: Raspberry patch border of woods. Date: July 7, 1901. Hour: 7 P.M. Collector: W. E. Snyder. Foster parent: *Dendroica æstiva*. Condition of stomach: Full. Percentage of animal matter, 100. Contents: Remains of at least 4 caterpillars, and 1 moth, 69%; 2 Membracidæ, 6%; and several ants, 25%.

No. 12. Female. Locality: Beaver Dam, Wis. Where killed: Brush in woods. Date: July 14, 1901. Hour: Early A.M. Collector: W. E. Snyder. Foster parent: *Melospiza m. melodia*. Condition. of stomach: ¼ full. Percentage of animal matter, 40; of vegetable, 60. Contents: Remains of 3 Carabids, 11%; about 6 Acridiidæ, 28%; 1 ant and another hymenoptera and traces of bug, 1%; 4 seeds of grass, 3%; vegetable fibers, 58%.

No. 13. Female. Locality: Bridgeport, Conn. Where killed: Weeds. Date: July 30, 1904. Hour: P.M. Collector: H. W. Beers. Fed by *Melospiza m. melodia.* Condition of stomach: ½ full. Percentage of animal matter, 50; of vegetable, 50. Contents: Bits of several ants, 40%; and 1 spider, 10%; trace of caterpillar (spiracle plate), tr.: 1 seed of *Cuscuta* and 1 of *Polygonum,* 2%; much vegetable fiber, 50%.

No. 14. Unsexed. Locality: Wayne Co., Mich. Where killed: Mud flats. Date: July 9, 1905. Hour: 10 A.M. Collector: P. A. Taverner. Fed by *Melospiza m. melodia.* Condition of stomach: Full. Percentage of animal matter, 72; of vegetable, 28; of gravel, etc., 15. Contents: 2 *Sphenophorus* sp., 55%; 1 Pentatomid, 15%; 1 Chalcid, 2%; 2 sedge seeds and bits of grass blumes, 28%.

I never collected any young Cowbirds for stomach examinations and my notes are entirely observational. I have seen cutworms and cankerworms fed young Cowbirds by Chipping Sparrows on several occasions, also by Song Sparrows, Rose-breasted Grosbeaks (on one occasion), Red-eyed Vireos, Warbling Vireos, Chestnut-sided Warblers, and Maryland Yellow-throats.

On July 10, 1921, I watched a nest of a Red-eyed Vireo at close range from a blind and recorded the feeding. The nest contained two young Cowbirds. Originally it held two young Vireos in addition to the parasites but they both perished from starvation on July 9. A list of all the food materials fed by this pair of Vireos may be of some interest.

1. "Cutworms"
2. Small Insects
3. Spider
4. Small Yellow Moth
5. Larva of Io Moth
6. Large Black and White Caterpillar
7. Green Caterpillars

It was impossible to identify most of the food and as the bird was not collected there was no way of checking results.

A nest of a Chestnut-sided Warbler was watched on several different days. On June 10, 1922, the nest held one young Cowbird, one Cowbird egg and three Warbler eggs. The female warbler was still incubating its other eggs but stopped every little while and fed the Cowbird cutworms and plant lice (?). On June 15, the nest contained just the young Cowbird. Both old warblers were seen feeding it. At 10:38 A.M. the female brought a cutworm; at 10:40 the male fed the Cowbird a fly of some unidentified sort; at 10:43 the male brought a wasp (?); at 10:46 the female fed it a neuropteroid and then waited a second and the young Cowbird elevated the rear end of its body and muted. The female carried off the sac. At 10:48 the male brought a caterpillar. Then the female came without food and brooded for fifteen minutes. At the end of this period she flew off as the male approached at 11:03 A.M. with a cutworm which he gave the young Cowbird.

On the next day, June 16, the feedings observed were as follows:

9:53 A.M. female fed it a fly (?), waited at the nest a little while—the young Cowbird did not mute—female got on nest and began to brood.

9:57 male sang, female flew off and at

9:58 male fed Cowbird a mayfly and a wasp and flew off immediately.

10:01 female fed mayfly (?) and waited a little while—young did not mute.

10:15 male fed insect and flew off without waiting

10:16 female fed—young muted—female carried off the sac.

10:18 male fed small yellow moth

10:19 female fed two mayflies and one small moth and began to brood.

Shaver's detailed account of the rearing of a Cowbird along with two of the rightful young by a pair of Maryland Yellow-throats is profitable and interesting reading in this connection. (Univ. of Iowa Studies in Nat. Hist. vol. VIII, no. 2., 1918), A very brief summary of some of the points in this paper may be found under Maryland Yellow-throat, in the annotated list of the Cowbird's victims.

Perhaps the most unusual type of food ever given a young Cowbird to swallow is a young garter snake (*Thamnophis sirtalis*). This I observed on one occasion. I had put two very young (2 days old) Cowbirds in a Robin's nest convenient for watching. When the Cowbirds were fairly large (7 days old) I happened to pass and saw about two inches of the tail of a very young Garter Snake protruding from the mouth of one of the young Cowbirds. Half an hour later when I revisited the nest the snake had entirely disappeared into the alimentary tract and the youngster seemed no worse for his ambitious appetite. An hour later I revisited the nest and was surprised to see this same bird being fed again by the Robins. Earthworms were fed by the Robins to some extent.

Aside from this I have never seen young Cowbirds being fed anything but insects, both adult and larval, and spiders. However, egg shells, a few seeds of Yellow Foxtail, *Chaetochloa glauca* and some other weeds have been noted in stomach examinations (*vide ante*).

Behavior and Development of Instincts. For convenience in discussion we may divide the nest life of the young Cowbird into three stages. These stages are fairly distinct but no hard and fast lines can be drawn between them.

1. Period of Infancy—from birth to the age of four days.
2. Period of Sense Perception—beginning with the opening of the eyes; usually attained on the fourth day.
3. The Flight Stage—when the young, fully fledged, leave the nest, usually attained on the ninth or tenth day, but sometimes postponed until as late as the twelfth day.

1. *The Period of Infancy.* When first hatched, young Cowbirds are blind and helpless and seem entirely unfit for the coming struggle for existence with the rightful occupants of the nest. The first feeding, however, seems to give them a start, and from then onward their strength increases rapidly and their growth, (as is that of most birds), is little short of phenomenal.

At birth the young Cowbird exhibits powers of orientation, food reactions, and initial call-notes. Herrick, in writing of the Black-billed Cuckoo says the following which I find applies with equal truth to the Cowbird.

"The power of orientation is quickly established the moment the bird entirely quits the shell and becomes exposed to the full influence of the air. If . . . . turned on its back, it will struggle to right itself, and usually succeeds in doing so promptly." (Journ. Expt. Zool., 1910, pp. 202-203.)

The food-reaction, ". . . . is a complicated act, in the course of which the head is elevated, and the mouth opened wide. . . . .

"This complex performance, which represents the simplest sign-language of the hungry bird, appears as a uniform chain-reflex, and is predictable, and seems to be as mechanical as the response of an electric bell" (loc. cit. p. 200). The food-reaction is particularly interesting in the Cowbird in that it is not modified through association as with most birds. In order to better appreciate this unique state of affairs it may be well to briefly review the normal trend of modification, and in this we can do no better than to use the words of the foremost student of nestling behavior, F. H. Herrick. In discussing food-reaction he writes;—"It does not, however, long remain in this unmodified state. Though at first called into play, so far as can be ascertained by an external stimulus alone, as by jarring, sound, and possibly by the action of the air, and as often as any stimulus acts, within the limits of fatigue, from the moment of birth this reaction becomes modified intermittently (a) by hunger, and steadily (b) by association with the parent and normal environment." (loc. cit. p. 200). In another paper (Pop. Sci. Monthly, June 1910, pp. 553-554), he writes that,—"Initial responses of this sort are relatively perfect. Consequently they can have nothing to do with past experience. They represent the hereditary powers of a hereditary mechanism. Now the point of greatest interest is that this inherited tendency to respond, in the course of a few days becomes replaced, as it were, by an acquired tendency. Instinct becomes 'modified' by association. The mind or intelligence begins to take the reins, though feebly at first, into its own hands." He cites experiments in which he took young birds of various species out of their nests and tried to get a food reaction by making a sound, or slightly jarring the surface on which the bird was placed. He found that up to a certain age the birds would respond whether in or out of the nest while after they had attained that age they would not give the reaction out of the nest. The age in question varies with the different species, being four days in the Black-billed Cuckoo.

I tried to get food responses from young Cowbirds of every age from one day until the time they left the nest and was invariably successful. There seems to be no association with the nest or foster-parents in the mind of the young interloper. On two occasions I subjected seven day old Cowbirds to very rough treatment, tossing them up in the air and catching them, swinging them around by one leg, holding them suspended by a wing or by the head. No sooner had I put them back in normal fashion on my left hand and slightly jarred it with a finger of my right, than they gave the food reaction with much vigor and apparent earnestness—stretching the neck, opening wide the mouth and rapidly beating their wings and calling loudly for food. It is a matter of common observation to approach nests of various birds and find that the young occupants crouch down and remain quiet. Not so with the nestling Cowbird. No person or other animal can come near the nest but the young parasite will beg for food, confidently expecting the world to minister to its wants.

The initial call-note of the young Cowbird is a very faint *peep* and is not often heard, at least in my experience. About the end of the third day this *peep* acquires a stringy, strident quality which soon comes to dominate it, and the soft *peep* becomes a rather thin, strident *seer*.

2. *The Period of Sense Perception.* With the opening of the eyes on the fourth day the actions of the young Cowbird change considerably. It begins to take an interest in its surroundings, assumes new poses and indulges in several types of nest exercises. Perhaps the first noticeable

difference is in the posture of the bird. During the period of infancy it lies on its belly with the head resting on the floor of the nest—a more or less flat position, all in all. Shortly after the opening of the eyes, it begins to assume a sitting position, keeping the head up off the floor of the nest, and when the head is brought down to the nest it is usually on, or hanging over, the rim. The young Cowbird begins to take notice of things external to the nest such as passing insects, leaves waving in the wind and particles falling from nearby branches. Things in the nest that hitherto went unnoticed are now observed,—lice and other nest-inhabiting insects are snapped at. "If the heat of the sun causes them discomfort, they move restlessly about the nest, gape, and pant with vibrating glottis, tongue and lower mandible, precisely like an old bird." (Herrick, Journ. Exp. Zool. 1910, p. 205). The young Cowbird often yawns, and stretches its wings and legs in response to heat.

As far as I know the young Cowbird differs from the young of most other altricial birds in that it never develops any calls which may properly be termed "alarm calls", nor does it respond to, or understand, the alarm calls and danger signals of its foster-parents. Usually the instincts of adult and young fit like key and lock, but no such harmony exists between the nestling Cowbird and is nurse. Obedience to call notes is not only unknown but impossible because the language of the foster-parent is a sealed book to the interloper. In normal nesting birds, a danger call from the parent immediately causes the young to crouch down and remain quiet. On many occasions I have gone up to nests containing young Cowbirds, and the foster-parents hopped about greatly excited and repeatedly uttered their danger calls, while the young parasites kept begging for food, not paying the least attention to them. This has been recorded by many other observers as well.

The nest exercises of the young Cowbird are of four types.

1. Preening. The preening instinct first appears on the sixth or seventh day. The young bird spends a good deal of time preening its feathers from this time on until it leaves the nest, and this doubtless helps many of the contour feathers to break out of their sheaths.

2. Stretching the neck so that the head hangs over the edge of the nest and then slowly opening and closing its bill. What the significance of this exercise may be I cannot say, but it is not uncommonly indulged in.

3. Stretching upwards trying to reach near-by leaves, etc. I once saw a young Cowbird in a Red-eyed Vireo's nest actually reach a leaf over-

hanging the nest and then it just pecked at it once, seemed satisfied (or fatigued), and dropped down again.

4. In shifting their positions in the nest young Cowbirds often use their wings as hands, i.e., use them to get a hold on the materials of the nest with; also they often flap their wings fairly rapidly for short periods, about one second at a time.

Hardly to be considered in the same light as these nest exercises, are the actions of the young Cowbirds toward their step-brothers and sisters. It is well known that while the great majority of Cowbirds' eggs have for nest companions at the start one or more of the rightful eggs, relatively few nests support more than the young Cowbird after it is a few days old. What becomes of the other eggs or young? The answer to this question cannot be final until our knowledge is more complete. Quite frequently some of the eggs do not hatch and the young Cowbird is found in a nest with addled eggs. Usually, or very frequently at least, these eggs disappear after a few days. A few cases may serve to illustrate this.

On May 27, 1922, a nest of a Chestnut-sided Warbler contained two Cowbird's eggs and one Warbler's egg. On May 28 another Warbler's egg was laid; May 29 still another, and on May 30 the nest contained two Cowbird's and four Warbler's eggs. On June 9, one Cowbird hatched. On June 11 one Warbler hatched. On June 12 the nest contained the young Cowbird, the young Warbler, and the second Cowbird egg. The three Warbler's eggs were gone. The next day only the young Cowbird was found in the nest.

A nest of a Veery contained three eggs of its own and one of the Cowbird on May 25, 1922. On June 2, one of the Veery's eggs was gone. This could not have been due to the Cowbird as the latter was not yet hatched, but was probably accidental as far as our study is concerned. On June 5 the Cowbird hatched. On June 7, one Veery hatched. On June 8 the young Cowbird was the sole occupant of the nest. The young Veery was gone and the Veery's egg was on the ground beneath the nest but unbroken. I put the egg back in the nest and returned in not more than fifteen minutes and found the egg on the ground again. (The egg when put back was not far from the edge of the nest, and rested on the left wing and neck of the young Cowbird.) This seemed to hint at the possession by the young Cowbird of something like the evicting instinct of *Cuculus canorus*, and I put the egg back in the nest and watched it for about half an hour. The contact of the egg on the skin of the young Cowbird seemed to give rise to a disagreeable stimulus as the young Cowbird frequently moved the parts in contact with the egg, and several times moved the egg a little with its back, wings, and legs, but after about ten minutes settled down and paid no more attention to it. The Cowbird (3 days old) was still blind and with only a scanty covering of down and weighed 12.8 grams. The next day the egg was gone.

In the spring of 1921 a parasitized Phœbe's nest was watched, and on May 9 the Cowbird's egg hatched. There were two Phœbe eggs also in the nest. On May 12 one of the Phœbes hatched. On May 14 the Cowbird was alone in the nest, the young Phœbe had disappeared and the addled Phœbe's egg was on the ground beneath the nest.

These are just a few taken at random out of many similar cases. Not uncommonly the rightful eggs remain in the nest although such cases are in the minority. A nest of a Redstart was found on June 9, 1922, with two young Cowbirds five days old, completely filling and covering the nest. In the bottom beneath the young parasites were four addled eggs of the warbler.

When some of the rightful eggs hatch the young are usually starved or suffocated by the young Cowbirds, although nests are occasionally found in which one or more of the young survive together with the interloper.

On July 7, 1921, a nest of a Red-eyed Vireo was found containing two young Cowbirds and two young Vireos, the Cowbirds being about three times the size of the young Vireos. This was early in the morning. At 2:15 P.M. of the same day the nest contained the two young Cowbirds and one live Vireo; the other was dead in the bottom of the nest underneath the Cowbirds. On the ground beneath the nest was a freshly smashed Cowbird's egg. I marked one of the Cowbirds with black India ink in order to distinguish it from the other. Four minutes later the old Vireo came to the nest and fed the young Vireo and the "black" Cowbird. Fourteen minutes later it came again and fed the two Cowbirds. This time when the young Vireo stuck its head up for food, the "black" Cowbird turned its bill around toward it quickly and the young Vireo crouched down. After feeding, the two Cowbirds began to shift their positions elevating their rear portions and trying to get on top of the young Vireo, which, however, managed to keep on top of the back of the "black" Cowbird. Twelve minutes after the last mentioned feeding the old Vireo came again and this time the "black" Cowbird having the young Vireo on his lower back, backed up against the wall of the nest and pressed the Vireo against it, thereby preventing it from being fed. Both young Cowbirds were fed this time and not the young Vireo.

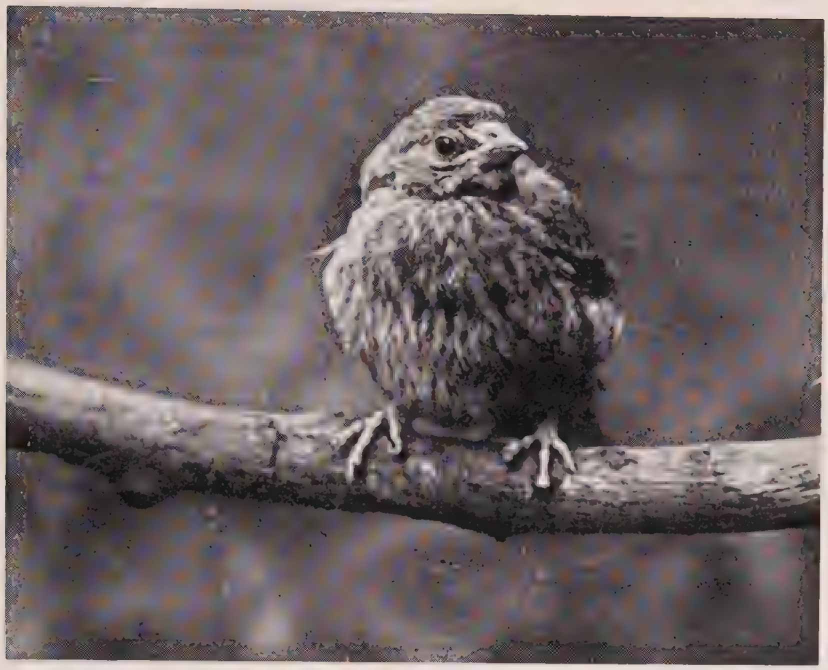
Eight minutes later, the parent bird came back again and this time the young Vireo managed to get his head up high enough and was fed first.

Both Cowbirds were fed also. Between feeding, the two Cowbirds lay fairly quiet, while the young Vireo, being evidently much hungrier, kept raising its neck and head and opening its mouth for food, almost continuously, even though the parent birds were not around. The next day the young Vireos were both gone.

The young Cowbird usually tries to trample on the other young in the nest and to this extent the death of the rightful young may correctly be attributed to the volition of the parasite. The question of starvation is however somewhat different. Birds do not feed their young in any definite sequence but always feed the one that seems hungriest first. Hunger is expressed by the food-reaction, i.e., the elevating of the head and opening of the mouth with the associated food calls. The bird with the longest neck and biggest mouth gets the food, and the Cowbird usually answers these requirements. Naturally endowed with an ample length of neck and size of mouth, the Cowbird usually possesses two additional advantages over its nest-mates. First, it is larger to begin with, thereby enabling it to raise its head higher, and second, it usually hatches a day or so before any of the others and thus gets a start on them.

Development of the Food Call. As stated before, the initial call, a faint *peep,* assumes, toward the end of the period of infancy, a strident quality which soon completely dominates it. The call changes to a thin, rather high, stringy *seer.* This reaches its full development on about the sixth day and, for a small passerine bird, is very loud and insistent. In the great development of its food call the Cowbird approaches the Baltimore Oriole and outstrips practically all of its numerous species of nest-associates. Towards the end of its stay in the nest this call drops slightly in pitch and bears more resemblance to the food call used by the Cowbird when out of the nest.

3. *The Flight Stage.* This stage of development is very short and is characterized by the first intimations of the instinct of fear and by an extension of the general nest exercises of the young bird. Instead of being content with remaining in the nest the young Cowbird now begins to climb about and perch on the rim or even on part of the supporting twigs. Its food response is augmented by a rapid quivering of the wings, the motion apparently being confined to the manus and carpus, the humerus not being involved. Occasionally it even takes a step towards its returning, food-laded foster-parent as though trying to meet it and be feed that much sooner. It frequently stretches its wings, and, on at least one occasion, I saw one scratch its head with its foot exactly in the manner of an adult bird.



Young Cowbird (*Molothrus ater ater*) Eighteen Days Old.

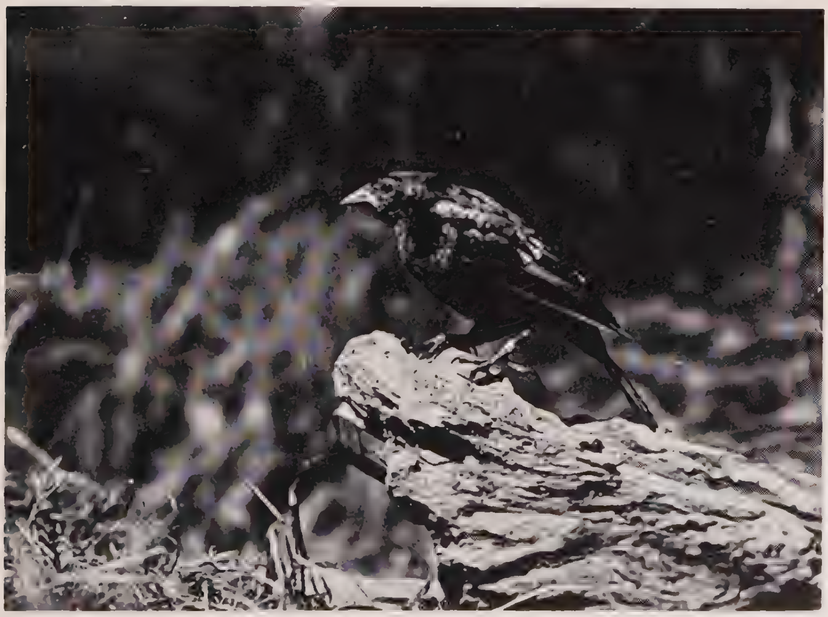


PLATE XXV.

Immature Cowbird (*Molothrus ater ater*) in Postjuvenal Molt.
(Captive bird)

Fear is first observed at about the ninth or tenth day although even then it is hardly developed. A sudden noise or jar may make the bird quit the nest but it will still permit of very close approach and clamor for food from the very source which may have caused it to leave the nest. The warnings and danger-calls of its foster-parents are not heeded, and, with quivering wings, slightly trembling body, and loud calls it appeals for food from every passing bird and even from humans.

The first flights are short and clumsy but after the bird had been out of the nest two or three days it is no longer easy to catch, although still quite fearless and unsuspicious. It usually remains in the immediate vicinity of the nest for two or three days and in the same general neighborhood for several days longer, about a week, all in all, and often longer.

The Young Out of the Nest

a. Observations on Caged Birds. Most of my observations of young Cowbirds after leaving the nest are of wild, free individuals. However, in order to get some details of growth I put young Cowbirds in small cages especially designed for the purpose. In doing this I took young Cowbirds just ready to leave the nest, put them in the cage and hung the cage in the tree near the nest. The foster-parents fed the young through the wire mesh and seemed not to mind it although a pair of Red-eyed Vireos did seem to want the young Cowbirds to follow them away from the nest tree after they had been in the cage three days.

When the young Cowbird is ready to leave the nest the chin and spaces around the eye are devoid of feathers. No feathers sprout in those places until the birds are eighteen days old. At this time the streaks on the feathers of the abdomen become more prominent as these feathers grow and the bare spaces are covered. The tail does not reach its full size until the age of twenty-one to twenty-five days is reached.

b. Observations on Free Birds. The young Cowbird, as stated before, usually remains in the immediate vicinity of the nest for two or three days, and in the same general neighborhood for several days longer, at least a week all together, and sometimes longer. It continues to be fed by its foster-parents for from two weeks to a month after leaving the nest. Often other birds, passing with food, are attracted by the loud, persistent appeals of the young Cowbird, and not infrequently even feed it.

Sometimes after being left by its foster-parents to its own resources the young Cowbird joins other families of young birds and begs for food from its new step-fosterers. I have seen a young Cowbird, fully grown in size and fully feathered, join a family of Chipping Sparrows containing three young about a week out of the nest and beg for food as though it was utterly unable to care for itself. The adult Chipping Sparrows fed it several times and then I approached the birds rather closely and they flew off but the Cowbird went by itself in a different direction from the sparrows, showing how loose were its connections with them. While the adult sparrows were gathering food the Cowbird picked up several bits of food itself but no sooner had either of the fosterers returned than the young parasite became a helpless, clamoring, over-grown infant. The change took place in an instant, the sight of the returning sparrow providing the stimulus.

However, sometimes young Cowbirds are not so successful and beg in vain. On July 2, 1921, a young Cowbird, full grown in size and fully fledged was seen following a Redstart and begging for food from it. The Redstart paid absolutely no attention to it although several times the two were very close to each other. All this time the Redstart was busy gathering food and when it had as much as it could carry it flew off and the young Cowbird did not follow. On July 8, 1921, a young Cowbird was seen following a Wood Pewee which always turned on it when it came too close and tried to drive it off.

Fall Migration

Preceding the beginning of actual migration, the Cowbirds, having finished molting, form large flocks on the uplands. Eaton records a flock containing about 10,000 Cowbirds so densely massed that by a single discharge of both barrels of his gun he collected sixty-three birds. There may have been more that he killed but failed to find. The largest flock I have ever seen contained about 2,000 Cowbirds and 2 Starlings. About three-fifths of the birds were females. They were first seen September 25th in a large pasture field where about fifty cows and horses were grazing. The animals seemed entirely oblivious to the presence of large numbers of the birds very close to them. Towards dusk the birds separated in three directions, one part going south and roosting in several tall trees; another part toward the farm house on the north side of the field and roosting in two large trees behind the barn; and the third part going east and out of sight. The next day only about 800 Cowbirds were seen in this field and on the following day the number had decreased to about 150. Frequently large flocks composed entirely of young birds in the post-juvenal molt are seen towards the end of August. One flock of about 300 was seen on August 22, 1922, in the "Buffalo Enclosure" at the New York Zoological Park. There was not a single adult bird in the flock, all being young birds in the process of molting. About two-thirds of this flock were males. Further south these flocks of immature Cowbirds appear as early as the end of July. Mrs. Margaret M. Nice writes me that in Oklahoma great flocks of Cowbirds appear towards the end of July.

At Ithaca definite migration begins about the twentieth of September. The birds now come to the marshes with the Red-wings at night, and during the day wander about in large flocks. The migration begins with the arrival of birds from the north, these individuals being doubtless largely responsible for the great size of the flocks found in September. As far as my local observations go, these northern individuals do not arrive in noticeable quantities until the beginning of the third week in September. It is very puzzling therefore to find that in the southern states the first migrant Cowbirds are seen as early as the end of July. Wayne (Birds of S. Carolina, 1910, p. 108) writes that

> "Although the Cowbird, a winter visitant, arrives as early as July 25, it is not really abundant until January and February. . . . ."

As mentioned above, great flocks of Cowbirds appear in Oklahoma about the end of July. The Cowbird breeds in Oklahoma but not very commonly. These flocks then must contain birds coming in from elsewhere. From the south is not likely. Cooke (Auk, 1914, pp. 482-3) writes as follows of the Cowbird in Oklahoma.

> "Already common by September 1, in flocks containing both males and females; from September 26 to October 9, these flocks increased in size until they contained 100-150 birds in a flock. The increase continued for the next month until by November 2, they were present in multitudes swarming over the cornfields and around the barnyards. Then they decreased rapidly and only a few were seen after November 15."

At Ithaca the bulk of the migration is over by the third week in October although stragglers are found until the third or fourth of November. The last birds to leave are birds of the year. Specimens collected at the tail end of the migration revealed some juvenal feathers among the newer ones. It may be that these individuals were not as healthy as they might have been, (this is supported by the incompleteness of the molt), and delayed migrating but it is more likely that the young normally migrate last. Occasionally a few Cowbirds winter in the vicinity of Ithaca, and so may obscure the end of real migration.

Plumages and Molts

The best and most complete account of the plumages of the Cowbird is that given by Dwight, (1900, p. 159), who is quoted in full below.

Male

1. Natal Down: olive-gray.
2. Juvenal Plumage acquired by a complete postnatal molt.

Above, including sides of head and neck, wings, and tail dark olive-brown, the feathers edged with pale buff, whitish on the primaries. Below, dull white, buffy on throat, breast and flanks much streaked with olive-brown. Chin white or yellowish. Bill and feet raw amber-brown, darkening to black after postjuvenal molt.

3. First Winter Plumage acquired by a complete postjuvenal molt which begins about September first. Unlike the previous plumage chiefly black instead of brown, young birds becoming practically indistinguishable from adults.

Above and below the lustrous black with irridescent green and purple reflections. Head, nape and throat purplish clove-brown. Some birds show faint buffy edgings.

4. First Nuptial Plumage acquired by wear, which shows very little and chiefly in the paler brown of the head. I have seen one specimen which had retained a large part of the juvenal plumage even to wing quills and the brown feathers are excessively worn as compared with the black ones acquired at the postjuvenal molt.

5. Adult Winter Plumage acquired by a complete postnuptial molt in September. Adults are not distinguishable, as a rule from young birds in first winter dress.

6. Adult Nuptial Plumage acquired by wear as in the young bird.

Female

In natal down and juvenal plumage indistinguishable from the male. Females assume a mouse-gray first winter plumage by a complete postjuvenal molt and this, modified by wear, is the first nuptial plumage. All later plumages are similarly mouse-gray with indistinct dusky streaks.

All the races are alike except in size, for which see key, p. 145.

Stone, (Proc. Phila. Acad. Nat. Sci., 1896, p. 134), observes that the spring, (nuptial), plumage is acquired from the winter plumage by wear, but notes that the abrasion is far more noticeable in the female than in the male. In regard to the male he writes:—"There seems to be no spring molt whatever, and almost the only effect of abrasion is to emphasize the line of demarkation between the brown head and the black back." This is probably what Dwight had in mind when he said that the chief effect of wear showed in the, "paler brown of the head." All the fall males collected at Ithaca had the brown of the head with a decidedly greater purple tinge than any of the spring birds. Examination of a large series at the American Museum of Natural History in New York City, and the Museum of Comparative Zoology at Harvard University, bore out this point, the fall birds having the head more purplish than the spring ones. In extreme specimens, i.e., fall birds with the maximum purple and spring birds with the minimum, the difference is very striking. Three young males were captured while in the postjuvenal molt and kept through the winter. When they finished the molt and came into the first winter plumage the brown of the heads was decidedly purplish. The purple color apparently gradually faded out and left the brown more noticeable.

During the postjuvenal molt the male assumes a striking appearance with irregular blotches and patches of black showing among the grayish brown of the juvenal plumage. During this time of molting the young birds tend to form large flocks. As a rule these flocks are composed entirely of young birds, adults being found with them only occasionally. In fact the evidence seems to point to the fact that the adults spend their postnuptial molting time in the marshes. The young birds are to be found around cattle more at this time than at any other season.

The order in which the feathers of the body are molted has been worked out for postjuvenal molt of the male. This molt was chosen for study because the new feathers of the first winter plumage are so different in color from the old ones of the juvenal plumage that it is easy to tell at a glance how far the molt has gone. The order of renewal has been worked out by field observations at close range of large numbers of young; by a study of the molting specimens in the American Museum of Natural History and a rather hurried survey of the collections of the U. S. National Museum and the Museum of Comparative Zoology. The order of the molt in several captive birds was studied but was found to be entirely unreliable as the conditions of captivity played havoc with it. In fact the birds never finished their molt but went through the winter and the next spring with some patches of juvenal feathers, particularly around the eyes and on the middle of the belly. As far as could be determined, the feathers are renewed in the following sequence. The first feathers to be replaced are the middle upper wing coverts, then the lesser upper wing coverts and interscapulars; then the greater upper wing coverts, scapulars, back and rump; then the sides and flanks, then the tail beginning with the outermost pair of rectrices. About the time the outermost tail feathers are shed the innermost primaries are also lost. Usually the three innermost primaries are shed before the outermost secondary is dropped. The primaries molt from the innermost outward and the secondaries from the outermost inward. The tail molt seems to be finished, i.e., the new middle pair of feathers are just sprouted by the time when all but the two outer pairs of primaries and the three inner pairs of secondaries are renewed. The head feathers are molted in irregular fashion while the remiges and rectrices are being dropped. The last feathers to be renewed are the alula or spurious wing, a few of the flank feathers, and a streak on the middle of the belly.

It should be understood that the order here given is the order in which the different groups of feathers *begin* to molt. That is, all the feathers of the scapulars back, and rump, for example, are not renewed before any of the flight feathers begin to drop. The molts of the various regions of the body begin and end in a certain sequence but the molts of these areas overlap considerably in time.

These notes all refer to the postjuvenal molt of the male but it is likely that all of the molts have the same sequence. I have no notes on the molt of the under wing-coverts. The upper tail coverts molt with the feathers of the rump and the under tail coverts with those of the belly.

There seems to be some variation in the order and rapidity of the molt within groups of feathers. In the case of the feathers of the tail usually the outermost pair are dropped first and the next pair do not drop out until the new outer pair have started to grow. Two specimens in the American Museum of Natural History illustrate variations in this respect. One, No. 82,507, is of the normal type, the middle pair of rectrices are little more than half grown while the five outer pairs are practically full grown. Specimen 65,424 has the tail all molted, i.e., the feathers are all new, but all the rectrices are little more than half grown. This specimen almost looks as though the bird lost its juvenal tail by accident and all the new feathers came in at once.

There is some difference too in the relative time of the molt of certain feathers in the Cowbird and in some of the other blackbirds. Thus in the Cowbird the molt of the lesser upper wing coverts is practically finished when the sixth pair of primaries is molted, while in a Red-wing in which the primary molt has reached the same stage the lesser coverts have just begun to be molted. The Bobolink agrees more with the Red-wing than with the Cowbird. (See Stone, Proc. Phila. Acad. Sci., 1896, p. 116.)

Pathological Plumages. Albinism is rather rare in the Cowbird. Several cases have been reported, five of which are given below.

J. L. Hancock (Orn. and Ool., 1883, p. 24) records an albino Cowbird shot August 11, 1881, at Kaneville, Illinois. It ". . . . was of a creamy white color with the exception of the head and breast, which were a little more on the yellow tint. . . . . Iris was of a fire red. . . . . The pupil was pink. . . . ." The sex was not determined.

Mrs. Margaret M. Nice (Wilson Bull., 1921, pp. 145-146) records an albinistic specimen from Oklahoma, also unsexed. It was pure white above, but underneath its tail was slightly *pinkish* and there were faint dark stripes on its breast.

An albino Cowbird was seen in Henrico County, Virginia, November 5, 1881 (Proc. U. S. Nat. Mus., 1889, p. 413), and Henshaw collected another at Washington, D.C., April 5, 1884.

An albino Dwarf Cowbird was seen at San Antonio, Texas, in the summer of 1894 (files Biological Survey).

Care of the Plumage

There is nothing especially noteworthy in the way the Cowbird cares for its plumage, and, were it not for the fact that practically nothing has been written about this activity in birds generally, there would be no real object in mentioning it.

In the Cowbird the plumage is cared for in at least three distinct ways: first, by preening with the bill, second, by oiling, and third, by bathing.

Preening is used for caring for individual feathers, oiling takes in groups of feathers, while in bathing all the feathers are more or less simultaneously affected.

In preening, the feather is always grasped near its base and then the bill is moved along the feather towards the tip, in this way removing foreign particles that may have become attached to it.

In oiling, the bird presses down upon the uropygial gland with its bill, until a drop of oil is exuded, which it then takes on the ends of the mandibles and spreads over the feathers. Oiling is not primarily for cleaning the plumage, but more particularly for keeping it sleek and doubtless aids in rendering it more or less proof against rain and storms in general. If preening may be compared to combing, then oiling corresponds to brushing.

Bathing serves a double purpose, of which, cleaning the plumage is the lesser. Its chief purpose is for the riddance of insect parasites—mallophaga, etc. In a way this comes under the topic of care of the plumage. In ridding itself of insect pests the Cowbird also resorts to taking sun baths. Sometimes in the heat of the day Cowbirds perch motionless with their feathers all fluffed out, the body being held slightly more horizontally than in the normal attitude. Once in a while they stretch their wings but on the whole they stay in one position. I have seen a captive Cowbird take a sun bath sitting on the ground but this could hardly be as effective as if it were on a perch because the ventral feathers would not derive any benefit from it.

Brother Alphonsus (Am. Midland Naturalist Vol. III, 1913-14 p. 24) writes the following about the bathing habits of the Cowbird.

"Two telephone wires lined with Cowbirds for about 100 feet. The birds were perched close together, the males and females . . . . Many others in company with many Grackles were bathing just beneath at the edge of a lake. I have observed this bathing of Cowbirds before at this time of the year." This was observed on September 6, 1912, from 5:15 to 5:45 P.M.

ASSOCIATION WITH CATTLE

As the name of the bird suggests, Cowbirds are frequently found in pastures with cattle. In some localities especially in the prairies and plains west of the Mississippi, this association is much more marked than in the eastern states. At Ithaca relatively few of the Cowbirds observed were with cattle, but this probably partly due to the fact that this region is not given to stock raising. On a dozen or so occasions, however, flocks of these birds were found consorting with cows. While Cowbirds may be found around horses and cattle at almost any time it is chiefly from midsummer until the end of the fall migration that they are to be looked for in the company of these animals. In the early days the Cowbirds followed the herds of Buffalo and in some places the birds are still known by the name of Buffalo Bird.

Edwin P. James (1823 vol. II, p. 199 footnote) in his compilation of Major Long's expedition from Pittsburgh to the Rocky Mountains in 1819 and 1820 writes that,

> Amongst the herds of these animals (Buffalo), we very frequently saw flocks of the Cow Bunting, *Emberiza pecora.* The manners of this bird, in some respects, are similar to those of the *Tanagra erythrorhyncha* of Lord Stanley, in Salt's travels, flying and alighting in considerable numbers on the backs of the bisons, which from their submission to the pressure of numbers of them, seem to appreciate the services they render by scratching and divesting them of their vermin. The bird is here, as well as in the settlements, remarkably fearless. They will suffer us to pass very near to them, and one of them today alighted repeatedly on the ground near our horse's feet: he would fly along our line, balance himself on his wings, to gratify his curiosity, within striking distance of a whip.

C. A. Murray (1839 vol. I, p. 189 footnote) in recounting his experiences in North America during the years 1834-1836 says the following. "The prairie blackbirds are the tamest of the bird creation that I have seen in any country. . . . . They repeatedly perched upon the back of the Buffalo, and of our horses, saddled or unsaddled. I have, more than once, seen them venture upon the shoulder of a man; and the young Indian boys practise their early archery by shooting them at the distance of two or three yards." W. H. Emory (1848 p. 26) also reports Cowbirds as being very tame, alighting on his horses.

The best account of the association of the Cowbird with the Buffalo is that given by Seton in his "Life-histories of Northern Animals" (1909 vol. I, pp. 283-285), which is quoted below.

> In all this pastoral scene, there is a flock of small blackbirds, "cowbirds" or "buffalo-birds" they are called. They haunt the Buffalo as negroes do a Mississippi raft-house, sometimes on it, sometimes on the nearest land, but alway moving when it moved, and recognizing it as headquarters.
>
> . . . . Sometimes the cowbirds walk sedately behind their grazing monster; sometimes they flit over snapping at flies; often they sit in a line along the ridgepole of his spine. Their attachment to the Buffalo was so close that an Indian

> myth tells of their nesting in the wool between the horns of the big bull—rather a fearsome homesite, one would think, during a combat of the bull with some huge rival. . . . .
>
> One more incident: In the park at Silver Heights, near Winnipeg, is a herd of a dozen Buffalo. All summer they are followed by the usual flocks of Cowbirds, which fly southward when cold weather arrives. But when the autumn of 1900 came, one stayed when the others left. All through that Manitoba winter it remained with the Buffalo, especially with the biggest bull of the herd. Its food was of the Buffalo's food; by day it flitted near or warmed its toes in the wool of the animal's back; by night it snuggled on a sort of hollow it had made in the wool just behind his horns. The Buffalo was protector of the bird against famine, frost, and the attacks of both animal and human foes; for he was so fierce that none dared to come near him, even to inspect more closely the Cowbird that had committed itself to his charge. This incident is attested by Dr. S. J. Thompson, the veterinary of the Province, by George Grieve, the taxidermist, and by T. A. Prescott, the keeper.
>
> Grieve tells me that he thinks the bird was wounded and unable to fly when its kinsfolk went South, and so made the best of the situation; and not so very bad it proved, for it was fat and fit in the spring.

I have given considerable space to the relations between the Cowbird and the Buffalo because of its historic interest. The things that once were common happenings but that can occur no more in spite of our longing to witness them have an undeniable appeal to human nature. Even the despised, much-maligned, "immoral," parasitic Cowbird has its little glamor of romance, although it be but basking in the reflected glory of its former mighty companion, the Bison.

Every year large flocks of young Cowbirds in the pustjuvenal molt may be seen during August and early September around the Bison in the New York Zoological Park. This association of the Cowbirds with these former monarchs of the plains is perhaps one of the most striking and natural, and at the same time the least planned and predetermined of all the exhibits in that great zoological park. However the Cowbirds seem absolutely impartial in their choice of quadrupedal friends and consequently they often cross the borders of the Buffalo cage and consort with the Eland Antelopes of Africa, the Yaks of Central Asia, and the Emus of Australia, which of course in a natural state would be impossible.

Today the countless millions of cattle that swarm where the Buffalo once held sway have replaced their precursors in the economy of the Cowbird. A few notes on the association of Cowbirds and cattle may not be out of place before attempting any explanation for this habit.

Alexander Wilson (1810, p. 153) writes that,

> ". . . . the appearance of this bird in spring is sometimes looked for with anxiety by the farmers. If the horned cattle happen to be diseased in spring, they attribute it to worms, and consider the pursuit of the birds as an unerring indication of the

> necessity of medicine. Although this hypothesis of the worms infesting the cattle so as to produce much disease is problematical, their super-abundance at this season cannot be denied. The larvæ of several species are deposited in the vegetables when green, and the cattle feed on them as fodder in winter. This furnishes the principal inducement for the bird to follow the cattle in spring, when the aperient effects of the green grasses evacuate great numbers of worms. At this season the Pecoris often stuffs its crop with them till it can contain no more. There are several species, but the most numerous is a small white one similar to, if not the same as, the ascaris of the human species."

Audubon has a somewhat similar account.

This assumption that the Cowbird stays around cattle to get the discharged worms has never been substantiated and, in spite of Wilson's statement that the Cowbird "often stuffs its crop with them" food examination fails to reveal anything of the sort.

Cameron (Auk, 1907, pp. 396-397) in Montana writes:

> I have often noticed at my ranch, when a saddle horse was turned loose, how numbers of previously unseen Cowbirds would suddenly appear from space to perch upon him and run up and down on his back. Horses are corralled here which are covered with Cowbird excrement, and on June 3, 1894, I drove up my saddle horses with seven Cowbirds perched on the back of one of them. My neighbor. Mr. H. H. Tusler, has caught Cowbirds on horses with his hands.
>
> In summer when a bunch of cattle is driven to some outlying pasturage, Cowbirds often follow the drove for the whole distance, alighting constantly upon, or just in front of the animals. Many times it seems as if the birds cannot avoid being trodden on, but they just manage to run out of the way in time. Occasionally, the Cowbirds leave the cattle to dart after flying locusts which they catch very cleverly with their bills.
>
> It would seem that Cowbirds sometimes attach themselves to particular cattle, follow them wherever they wander, and drink when they go to water. I noticed young Cowbirds, in August, 1905, which were inseparable from certain cattle of mine for at least a week. Two of these birds were quite buff in color with dusky streaks and easily distinguished.

Cattle and horses are not the only domestic animals that Cowbirds associate with. Vernon Bailey, in August, 1909, in the region of Terry and Mt. Sheep, Butte, Montana, found Cowbirds common about ranches and with flocks of sheep. "Several small herds we saw standing under shade trees had six to twelve Cowbirds sitting on their backs and heads picking in the wool and evidently getting ticks or flies." (files, Biol. Survey) Dawson (Condor, 1916, p. 28) records seeing a fully mature Dwarf Cowbird riding about on the back of a hog.

Of the close relatives of the Cowbird, Brewer's Blackbird is the only one that seems to have been recorded as commonly associating with quadrupeds.

Brewer's Blackbird has been noticed perching up the backs of sheep scrutinizing their fleece, probably for ticks.

Beal (1900, pp, 22-23) writes:

> "Why the birds (Cowbirds) chose such companions is difficult to explain, as there does not appear to be any special relation between them, but their association with domestic animals is a matter of common observation, and has given rise to their popular name. Both Audubon and Wilson ascribe the habit to the desire of the birds to feed upon the intestinal worms they find in the cow droppings. Stomach examination, however, entirely fails to bear out this supposition. The insects that annoy the animals do not constitute any considerable portion of the Cowbird's food, nor are the seeds upon which it subsists found to any particular extent where the cattle range."

In his discussion of the food of the Cowbird he says (pp. 24-25):

> "Wasps, ants, and flies, especially the last, are the insects that might be supposed to attract the birds to the cattle, but the stomachs do not show that many are eaten, for altogether they amount to less than 3 per cent of the food, and the wasps and ants are the most important constituents of this percentage. The wasps are probably picked from flowers while gathering honey and the ants are collected from the ground."

In attempting any explanation of the association of Cowbirds with cattle (or buffalo) we should remember that it is not due to any fondness on the part of the birds for the company of the animals but to some benefit that the birds derive from their presence. This benefit cannot possibly be concerned with the preservation of the race, i.e., with the reproductive activities of the bird, and must therefore be concerned with the welfare of the individuals. Two possibilities present themselves—food and protection. Of these two the former is infinitely more likely than the latter. In spite of the incident mentioned by Seton, (and quoted a few pages back), there is little chance of the Cowbird securing much protection from the Buffalo. (It may be said here that the present association with cattle is fundamentally the same as, and is a modification of, the original attachment to the Buffalo and consequently we should deal with the nature of the problem from the standpoint of its original, "natural," unmodified state.) Predacious animals which might affect the Cowbird would be commoner, if anything, around the Buffalo herds than elsewhere. The Cowbird, therefore, could not have derived much protection from its association with the Buffalo. Food then must be the key to the problem. As we have already seen the supposition that the intestinal worms discharged by the animals might be the source of attraction has been found to be erroneous. Wasps, ants, and flies form no great part of the food of the Cowbird and the presence of these insects around the Buffalos could not have been the force which attracted the birds. Yet the food attraction must have been of an animal nature. Vegetable food would naturally be scarcer where great herds of herbivorous mammals were grazing for some time than elsewhere. Furthermore, in the plains, vegetable food is equally abundant all over. Why then should the Cowbird accompany the Buffalos if seeds are the attractions they seek? However, animal food, which in the case of the Cowbird, is entirely insectivorous, depends on the distribution of plants for its dispersal. Since the plants are widely and equally dispersed over great areas the insects too have a wide dispersal of relatively equal density throughout. Then it cannot be that the animal food which the Cowbirds want is especially abundant around the herds of grazing beasts. If the actual food supply is not increased by the Buffalo herds then it must be that the animals render it much more available. This seems to be the correct explanation and is borne out by stomach examinations. In grazing, the animals scare up the swarms of grass-inhabiting insects, especially grasshoppers and locusts, with every bite, and in this way render the food supply, which was already there but hidden, far more available to the birds. It is chiefly during the summer and fall that the Cowbirds gather around their four-footed companions and it is in this same season that the grasshoppers are most abundant. Beal writes (1900 p. 26)—"Grasshoppers appear to be the Cowbirds' favorite animal food, and compose almost half of the insect food, or 11 per cent of the whole. They . . . . reach a maximum of 45.1 per cent in August and decrease to 6.5 per cent in November." Leaf-hoppers, which, in spite of their name, are grass-inhabiting insects, are eaten to a large extent, forming about 60 per cent of the total contents of some stomachs. The greater part are eaten in June and July. All these insects are naturally hidden in the grass and would be difficult for the Cowbird to obtain were there not some agent to cause them to jump up and reveal themselves. The grazing action of the Buffalos (or the cattle) provides exactly such an agency. The animals do not cause or bring about a supply of food for the birds but help them to find the stores of food existing all around them.

Whether the Cowbird retaliated the good services of the Bison in any way is quite impossible to say but seems extremely doubtful. Occasionally some Cowbirds perceiving the approach of an enemy might by their actions have warned the Buffalo but even this is hardly likely as all accounts agree in the excessive tameness, amounting practically to stupidity, of the Cowbird on the prairies. A few bothersome ticks may have been removed by the Cowbirds, but on the whole, the Buffalos do not seem to have benefited by the companionship of the birds.

Widmann tried to find the origin of the parasitic habit in this tendency of the Cowbird to follow cattle but his idea has little ground to stand on. He states that the Cowbirds, following cattle or, originally Buffalo, wandered too far from their nests and when eggs were ready to be laid could not get back in time to use their own nests. It is somewhat surprising to find a naturalist of Mr. Widmann's ability advancing such a theory. Probably he meant it more as a suggestion to be taken for whatever it might be worth than as a real attempt at an explanation.

The Food of the Cowbird

The earliest account of the food habits of the Cowbird is that of Barton (Fragments of the Natural History of Pennsylvania). He writes that the Cowbird ". . . . follows cows and horses, pulling asunder their excrements in order to get at the seeds. It alights on their backs, eating flies and other insects from them." Wilson and Audubon believed the Cowbird ate large numbers of intestinal worms discharged by the cattle but this has been shown to be wrong. This matter has already been treated of in connection with the relation of Cowbirds to cattle and need not be repeated here.

Gentry (1876 pp. 355-356) gives a long list of the plant and animal food of the Cowbird but unfortunately there is so much of an unreliable nature in his identifications that it hardly pays to try and pick out the wheat from the chaff.

Aughey (1878 p. 33) says of the Cowbird in Nebraska that, ". . . . During locust years, it is found to feed largely on this insect as well as the flies and larvæ of flies that pester cattle."

Dean (Birds of W. Va., 1888 p. 68) states that stomachs of Cowbirds secured contained timothy and clover seeds. Elliott, (Auk 1889 p. 72) records that a wounded captive bird ate nothing but flies and even refused other food. A wounded bird might need animal food more than a healthy one or flies might have been the only insects Mr. Elliott could get for it. Merriam (U.S. Dept. Agr. Reports 1890 p. 285) lists the Cowbird as one of the birds known to feed on mulberries (*Morus alba* and *Morus nigra*), and Kirkland (Mass. Crop. Report 1896 p. 35) mentions the Cowbird as feeding on army-worms.

A. H. Howell, in his report on birds known to eat the cotton boll weevil (1906, p. 12), writes as follows:

> The Cowbird . . . . is the only Blackbird known to eat weevils, both in summer and winter, but the number consumed in each case is small. Forty stomachs of this

bird collected in winter showed only one weevil in the contents, and fifty-four stomachs taken in summer showed three containing one weevil each.

Isely (Auk 1912 p. 32) notes that, "Like the Grackles the Cowbird follows the plow in spring and feeds upon grubs." I can personally corroborate this last as I have on several occasions noted Cowbirds picking up white grubs in freshly plowed fields.

In the files of the Biological Survey is a note by Dr. Oberholser written at Mobeetie, Texas, Aug. 1901 to the effect that Cowbirds were seen feeding on the berries of *Cornus asperifolia*.

The food of the Cowbird has been worked out very carefully by Beal ('00) and his results are summarized below. However his work was done from the view-point of the economic ornithologist while we are more concerned with the ecological aspect of the subject. In other words the important thing for us in this connection is the relation of food to habit and the correlation of changes in the food with changes in the life cycle. In the course of this work numerous birds were collected at various seasons. To fill out certain gaps in my series of stomachs I have used the results of Beal's examination of Cowbirds taken in New York State. For this data I am greatly indebted to the Biological Survey at Washington.

We may start with a general consideration of the food of the bird in all parts of its range, using Beal's report as a basis and we can begin no better than by quoting his summary.

> . . . . the following points may be considered as fairly established: (1) Twenty per cent of the Cowbird's food consists of insects, which are either harmful or annoying. (2) Sixteen per cent is grain, the consumption of which may be considered a loss, though it is practically certain that half of this is waste. (3) More than 50 per cent consists of the seeds of noxious weeds, whose destruction is a positive benefit to the farmer. (4) Fruit is practically not eaten. Beal found that animal food was almost absent in January, February and March, and also in October, November and December, while in May, June, July and August it constituted about 50 per cent of the total food consumed. Surprisingly little sand or gravel was found—only a little more than 3 per cent . . . . a very small amount when the large proportion of vegetable food is considered.

In the present work the food has been studied from the standpoint of synchronous changes in the ecological complex of the Cowbird. While most of the birds collected at Ithaca were taken in Renwick Marsh, specimens were obtained from time to time on the uplands, in the breeding territories and in the feeding grounds of non-breeding birds. Resident birds have been found to eat more animal food than migrant individuals and of course do not feed in the marshes as do the birds bound for more northern districts. In the following table the nature of the food, whether animal or vegetable, is given in bulk percentages and is followed by a list of the seeds or insects identified. I have used Dr. Allen's paper on the Red-winged Blackbird as a model in this connection. This table includes all stomachs taken at Ithaca and pertinent records furnished by the Biological Survey. Those marked with an asterisk are from the latter source.

We may best discuss the food by treating it according to season and the corresponding stage of the life history of the bird.

Food During Spring Migration

This period will be taken as extending up to the end of April at which time many Cowbirds are already mated and established on their territories. It should be remembered however that migration continues into the begining of May. The food is secured chiefly on the uplands where the birds forage during the day in scattered bands usually rather small in size. Some food is taken in the marshes especially by those individuals that come in early in the evening. The food is largely vegetable, seeds of the yellow foxtail, *Chœtochloa glauca,* constituting by far the largest part of it. One bird collected on April 1, contained about 1200 seeds of yellow foxtail; another on April 7, 950 seeds, one on April 8, 975 seeds, two on April 26, 1000 seeds each; etc. Barnyard grass (*Echinochloa crusgalla*) and ragweed (*Ambrosia artemisifolia*) are also eaten.

Animal food constitutes from 10 to 15 per cent of the total contents of stomachs of migrating birds. The chief forms found are weevil (*Rhyncophora*) and lepidopterous larvæ. Some spiders, Scarabeids, Cicindelids, and Cerambycids are also taken, the last three being obtained on the uplands exclusively, while weevils and especially the lepidopterous larvæ are largely gleaned from the marsh. At this time of the year insects are still relatively scarce.

Food During The Mating Period

This period is rather short, taking in the last three weeks in April and the first week in May. The food of the resident birds is secured almost wholly on the uplands and, as far as my data goes is quite similar to that during migration. However, I have very little data on this period for resident birds and should expect that sufficient evidence would show a decided increase in the percentage of animal food.

Food During the Breeding Season

During the breeding season which may be limited arbitrarily by the dates May 1 and July 1, the percentage of animal food is greatly increased averaging about 50 per cent although in some stomachs it drops to 10 per cent or even nothing, while in others it mounts to 85 and 100 per cent. The yellow foxtail, *Chætochloa glauca,* is still the dominant vegetable food although *Polygonum, Ambrosia, Echinochloa,* and some grain are taken. Among the animal forms beetles, caterpillars, hemipterans, spiders, and orthopterans are eaten.

Food During the Molting Season

I have very little personally collected data on the food at this season but from my observations of the birds and from a survey of the literature it seems that the food of the adults and young should be treated separately. The young birds, in late July and August and the first two weeks in September gather around cattle, forming flocks in August and September. They molt in the pasture lands around the cows and horses and get their food in such places. The adults however, leave the uplands in late August and seem to disappear. Where they go is not absolutely certain but circumstantial evidence points to the marsh. I never found any molting adult Cowbirds anywhere but all signs seem to agree that, like the Redwings, the Cowbirds betake themselves to the protection of the marsh during this period of comparative helplessness. Animal matter is prominent in the food at this time, coleoptera and some lepidopterous larvæ predominating. Few seeds are available in the marsh at this time. Before going to the marshes, in late August, the food of the adults is like that of the young birds, largely animal in nature, grasshoppers and leaf-hoppers.

Food During the Fall Flocking

In late September and October when Cowbirds form large flocks, often containing several thousand individuals, vegetable food is on the ascendancy, forming about 80-85 per cent of the food, although in some stomachs it is only about 40 per cent or even less. *Chætochloa glauca* is again the dominant item of the birds' diet and the whole food is very similar to that of the spring.

Food During Fall Migration

The last half of October and the first few days of November witness the departure of the Cowbirds for the south, and, while the birds roost at night in the marshes, the food is secured entirely on the uplands and is practically entirely vegetable. The yellow foxtail gives the birds strength for their autumnal journey just as it relieved their hunger on their arrival some eight months before. The yellow foxtail is literally and figuratively the "staff of life" of the Cowbird.

We may conclude by saying that the Cowbird feeds upon whatever is most available, taking what it can get most easily. A bird endowed with very highly specialized organs might have difficulty in existing where the Cowbird lives with little expenditure of effort. Like the Red-wing, the Cowbird is successful because it combines great power of adaptability with a very generalized type of structure.

Date	Nature of Bird	Vegetable Food		Animal Food	
		Per cent	Forms Occurring	Per cent	Forms Occurring
3/25	Migr. ♀	90	Chætochloa glauca 1200 Echinochloa crusgalli 6 Unidentified 9%	10	2 Muscid puparis, 1 containing larva of a Braconid parasite, and the other with normal fly pupa. 2 Curculionids 2 Noctuid larvæ Rhyncophora shreds
4/1	Migr. ♂	85	Chætochloa glauca 100%	25	Rhyncophora Lepidopterous larvæ
4/1	Migr. ♀	100	Chætochloa glauca 1200		
4/5	Migr. ♂	100	Chætochloa glauca 95♂ Unidentified 5%		
4/5	Res. ♂	80	Chætochloa glauca 85% Woody seed coat 15%	20	shell (snail ?) Rhyncophora shreds
4/6	Migr. ♂	100	Chætochloa glauca 197 Echinochloa crusgalli 23 Unidentified 10%		
4/7	Migr. ♂	90	Chætochloa glauca 950	10	1 Aceratagallia sanguinolenta, sev. Noctuids 1 Cerambycid 1 Curculionid (Tanymecus sp) Coleop. remains
4/7	Migr. ♂	95	Chætochloa glauca 50% Unidentified 50%	5	Lepidop. larvæ—3 pieces Arachnida 1 Coleop. remains—7 pieces
4/8	Migr. ♂	95	200 seeds Chætochloa glauca	5	Coleop. shreds
4/8	Res. ♂	100	800 seeds Chætochloa glauca Unidentified matter 10%		
4/11	Migr. ♂	95	260 seeds Chætochloa	5	1 Lepidop. larva

Date	Nature of Bird	Vegetable Food		Animal Food	
		Per cent	Forms Occurring	Per cent	Forms Occurring
4/11	Res. ♀	50	Chætochloa glauca 95% Unidentified 5%	50	1 spider Lepidop. larvæ 4
4/14	Migr. ♀	95	Chætochloa glauca 90% Echinochloa crusgalli 5% Ambrosia artemisifolia 2% Unidentified 3%	5	Coleop. remains 100%
4/14	Migr. ♂	80	Chætochloa Other weed seed	20	6 Weevils (Sitona)
*4/14	Migr. ♀	80	Chætochloa Ambrosia	20	Spider remains 75% 1 Weevil (Sitona) 25%
4/17	Migr. ♂	100	Chætochloa glauca		
4/17	Migr. ♂	95	Chætochloa glauca 65% Unidentified 35%	5	1 Lepidop. larva
4/18	Migr. ♂	85	Chætochloa glauca 75% Rhus glabra (1) Unidentified 25%	15	Miridæ 1 Hesperiidæ (Pamphilinæ?) 1 Noctuidæ 1 Curculionidæ 1 Formicidæ (Winged Sexual Stage) 1
4/18	Migr. ♂	100	Chætochloa glauca 75% Polygonum sp 20% Unidentified 5%		
4/19	Migr. ♂	100	Few seeds of Polygonum aviculare (?)		
4/19	Migr. ♀	100	4 seeds Chætochloa glauca		
*4/19	♂	54	Ambrosia	46	4 Curculionidæ
*4/20	♂	98	Chætochloa	2	Beetle remains
*4/23	♂	100	Chætochloa Ambrosia-trace	trace	Cicindelid—1 piece

Date	Nature of Bird	Vegetable Food		Animal Food	
		Per-cent	Forms Occurring	Per-cent	Forms Occurring
*4/23	♀	75	Chætochloa Ambrosia	25	Scarabeidæ Curculionidæ Caterpillars
*4/25	♂	5	Chætochloa Unidentified seed (1)	95	Lachnosterna Aphodius inquinatus A. fimentarius Rhyncophora Caterpillars
4/26	Migr. ♂	100	Chætochloa glauca 1000 seeds		
4/26		60	Chætochloa glauca 1000 seeds	40	1 beetle pupa 1 large Noctuid (possibly Leucania) 2 small Noctuids (possibly Mamestra remigera) 2 Spiders—1 Thomisidæ? 1 Lycosidæ? Rhyncophoran remains
4/26	♀	75	100 seeds Chætochloa glauca	25	1 Lepidop. larva
4/28	Migr. ♂	100	Chætochloa glauca 550 Echinochloa crusgalli 15 Ambrosia artemisifolia 2 Unidentified 5%		
4/29	♂	100	Chætochloa glauca 75		
4/29	Res. ♀			100	2 pieces of shell (egg ?)
4/29	♀	100	Chætochloa glauca few seed coats		
4/8	♂	100	Polygonum pennsylv. 2% Grain (uncertain) 85% Unidentified 15%		
5/14	Res. ♂	60	Unidentified (seed coats of grain?)	40	Coleop. remains
5/15	Res. ♂	75	Chætochloa glauca Unidentified	25	Coleop. remains

Date	Nature of Bird	Vegetable Food		Animal Food	
		Per-cent	Forms Occurring	Per-cent	Forms Occurring
5/16	Res. ♀			100	3 Lepidop. larvæ
5/22	Res. ♀	50	Chætochloa glauca	50	Coleop. remains Spider 1
5/24	Res. ♂	100	Oats (?) 100%		
5/24	Res. ♂	75	Unidentified	25	Lepidop. larva 1
5/24	Res. ♂	60	Ambrosia artemisifolia Unidentified 15%	40	Rhyncophora remains 20% Scarabeidæ—1 leg Unident. Coleop. remains 15%
6/8	♂	85	Unidentified	15	Coleop. remains
6/8	♂	50	Unidentified	50	Coleop. remains
7/8	♀			100	Curculionidæ 24% Calendrinæ 10% Hemiptera 7% (2 Cicadula & 1 Heteroptera) Grasshoppers 15% Diptera 20% Ants 10% Caterpillars 14%
*7/8	imm. ♂	6	Vaccinium pennsylv. 6	94	3 Scarabeidæ 2 Elateridae 1 Heteropteron 1 Heterogyna 1 Spider 2 Phalangers 2 Caterpillars 1 Unidentified
*7/8	imm. ♂	2	Unidentified	98	6 Otiorhynchidæ 1 Heterogyna 1 Spider few bits of snail shell
*7/14	imm. ♀	12	Unidentified seeds	88	4 Curculionidæ 10% Hemiptera 5% Hymenoptera 15% Grasshoppers 50% Caterpillar 5%

Date	Nature of Bird	Vegetable Food		Animal Food	
		Per cent	Forms Occurring	Per cent	Forms Occurring
*7/14	juv.	4	Unidentified seeds	96	2 Aphrastus taeniatus 4% Heteroptera 8% Small Hymenoptera 2% Grasshoppers 82%
*7/17	ad. ♂	90	Chætochloa glauca	10	Coleop. remains
7/17	ad. ♂	10	Unidentified	90	Lepidop. larvae Coleop. remains
*7/30	imm.	100	Oats 90% Pulp of gall (?)	trace	Skin of Coleop. larva beetle shreds
*8/15	imm. ♀			100	1 small Hymenopteran 2% 1 small Dipteran 3% Grasshoppers 95%
*8/17	imm. ♀	99	Oats Chætochloa	1	Jaws of Grasshopper Trace of Hymenopteran
*8/17	imm. ♀	98	Oats and hulls 78% Cirsium 10% Unidentified 10%	2	Traces of an Elaterid beetle and a pupa case Bits of a Grasshopper
*8/17	imm. ♂	20	Oats	80	1 ant and trace of a beetle 3% Grasshoppers 76% Snail shell 1%
8/22	imm.	20	Unidentified	80	Coleop. remains
*8/26	imm. ♂	98	Oats 45% Chætochloa 53%	2	Curculionid 1% Grasshopper 1%
*8/29	imm. ♂			100	16 Crickets 75% 4 Grasshoppers 20% 1 Locust 5%
*9/21		100	Oats and hulls 30% Chætochloa 70%		
*9/21		100	Chætochloa 100%		
*9/21	10 ad.	98	Ambrosia	2	Grasshopper Cicindelid

Date	Nature of Bird	Vegetable Food		Animal Food	
		Per cent	Forms Occurring	Per cent	Forms Occurring
			Oats Panicum Chætochloa Phleum Polygonum Pulp of a gall (?)		Weevil Hymenopteran
*9/21	15♂	95	Oats Panicum Ambrosia Chætochloa Amaranthus Cerastium Rumex Sinapis nigra	5	Grasshopper Curculionidæ Heteroptera Elateridæ Ants Saw-fly Cicadula
*9/22	11bds.	98	Oats Chætochloa Panicum Ambrosia Rumex Polygonum	2	Grasshopper 2 small gasteropod shells probably marine
*9/23	3bds.	96	Oats Ambrosia Panicum Polygonum	4	Grasshopper Jassidæ Spiders Aphodius inquinatus Cicadula (2 spec.)
*9/24	18bds.	95	Corn hulls Oats Panicum Ambrosia Polygonum lapathifolium Sinapis nigra Polygonum trifolium Chætochloa	5	Grasshopper Curculionidæ Cicadula Minute Beetle Heteropteron Hymenopteron
9/26		25	Chætochloa	75	Grasshoppers, 6 or more
10/19	♀	95	Chætochloa glauca Echinochloa crusgalli	5	Coleop. remains
10/19	♀	98	Chætochloa glauca	5	Coleop. remains
10/24	Bird of the year ♂	100	Chætochloa glauca—300 Ambrosia artemisifolia—1 Echninochloa crusgalli —1		

The Economic Status of the Cowbird

The Cowbird presents difficulties to the economic ornithologist that are peculiar among North American birds. Beneficial in its food habits, its economic status is complicated by the fact that each Cowbird raised to maturity represents anywhere from one to six birds of some other species. The victims, as a rule, are birds whose food habits are as valuable as those of the parasite, if not more so. The question then becomes further involved when we remember that in the long list of victims there are species of various degrees of usefulness to the agriculturist. Some few forms, especially the denizens of the arid, untilled, and untillable alkali stretches of our West and, those that inhabit the open rocky plains of vast regions of Canada still beyond the last fence and rail of civilization are of no intrinsic, economic human benefit, measured in dollars and cents. Their time for monetary appraisal may come with further settling of the country, provided they survive. These species must therefore be forgotten temporarily and the economic status of the Cowbird determined without them. Many of the other species in the list are parasitized so infrequently that they too may be left out of our calculations. Only the birds commonly victimized need be considered here, and for the sake of clearness and brevity, we may restrict ourselves to the five commonest victims, the Red-eyed Vireo, Redstart, Yellow Warbler, Chipping Sparrow, and Song Sparrow. It should be remembered that every species on the list presents its own economic problem in regard to the Cowbird and that what may hold for one species may need modification in the case of others. Before going any further it may be well to review the opinions of previous writers.

Weed and Dearborn (1903, pp. 162-163) write that,

> ". . . . So far as its food habits are concerned, there is much to commend it, but as a parasite on other birds it is undoubtedly noxious. . . . . Every young Cowbird is reared at the expense of anywhere from two to five birds, each of which is of more value than he. This makes Cowbirds costly. Whatever benefits we derive from their food habits are more than overcome by their parasitic habits."

Forbush (1913, pp. 320-322) says that,

> "This much maligned bird . . . . is . . . . an essential part of nature's plan. Birds that rear their young are confined by necessity to a certain radius about their nests; but scattered bands of Cowbirds form a wandering, unattached light squadron of insect destroyers which all summer long can go wherever their presence is most needed. . . . . Undoubtedly its food habits are on the whole beneficial. . . . ."

Chapman (1901, p. 154) believes that the Cowbird should not be given protection.

> This bird is said not to be seriously injurious to grain, but its habit of laying in the nests of smaller and much more valuable species, the young of which are, in consequence, often starved, should be sufficient to warrant us in denying it legal protection.

It will be seen from the above three authors that considerable difference of opinion exists as to the Cowbirds' place in the economic scale. Beal (1900, p. 30) sums up the state of our knowledge in writing as follows:

> In view of the fact that so much has been said in condemnation of the Cowbirds' parasitic habits, it may not be out of place to inquire whether this parasitism is necessarily as injurious as has been claimed. When a single young Cowbird replaces a brood of four other birds, each of which has food habits as good as its own, there is, of course, a distinct loss; but, as already shown, the Cowbird must be rated high in the economic scale on account of its food habits, and it must be remembered that in most cases the birds destroyed are much smaller than the intruder, and so of less effect in their feeding, and that two or three Cowbird eggs are often deposited in one nest.
>
> The question is a purely economic one, and until it can be shown that the young birds sacrificed for the Cowbirds have more economic value than the parasite, judgment must be suspended.

Forbush's belief that the Cowbirds, "form a wandering unattached light squadron of insect destroyers which all summer long can go wherever their presence is most needed," is only partly true as Cowbirds have their definite breeding territories to which they adhere.

Cowbirds have never been seriously charged with the dispersal of cattle parasites and diseases and the birds are probably innocent of such practices. They do not feed on the cow droppings and so cannot serve as intermediate hosts of intestinal parasites.

The exact determination of the relative value of the Cowbird and its common victims is a matter requiring much more time and study than I have been able to give to it and consequently my remarks shall be of a general rather than a specific nature. The Red-eyed Vireo, Redstart, Yellow Warbler, Song and Chipping Sparrow, all lay on an average of 4 eggs to a clutch. The Redstart and Yellow Warbler are, as far as we know, single-brooded; the others have two broods a season. Because of this it is necessary to treat the two groups separately.

When a Cowbird is raised by a one-brooded species such as the Redstart it represents the total product of its pair of foster-parents for the year. The loss here is a very decided one if we consider the food consumed by one Cowbird and that which would have been eaten by the four Redstarts. However, judging from the constancy of the numerical status of the Redstart from year to year it seems as though three of the four young would succumb anyway to various dangers before the next year. Also we must remember that the Redstart is in many places more abundant that the Cowbird.

In the case of double-brooded birds such as the Chipping Sparrow, Song Sparrow and Red-eyed Vireo, the loss is just as great but is more fully compensated for. All the young of both broods would not survive and so the reduction of the number gives a better survival chance to the others.

While the Cowbird undoubtedly does more harm by its parasitic habits than it does good in destroying weed seeds and insects, nevertheless it should be regarded as an important member of Nature's system of checks and balances. The Cowbird's damage is noticeable only very locally; throughout the entire country it does not seriously affect the status of any species except in the case of species that are already very rare. At Ithaca, seventy-five per cent of all the Redstart's and Red-eyed Vireo's nests found are parasitized and yet neither of these birds are becoming scarcer. Their numbers remain approximately constant from year to year. The tracks of the Lehigh Valley Railroad cross some twenty-three streams in a distance of three and a half miles along the west shore of Cayuga Lake. Over each stream is a bridge and in 1921 twelve pairs of Phœbes nested under some of these bridges. Of the twelve nests of the first brood eight contained Cowbird's eggs, and of the second brood, three out of ten were victimized. In other words, out of twenty-two nests eleven, or half, raised no Phœbes. In 1922 there were again twelve pairs of Phœbes nesting there and out of nineteen nests found (both broods) no fewer than fourteen contained Cowbirds' eggs or young. In spite of this in 1923 the number of Phœbes was unchanged and Phœbes were just as common as ever in all sections around Ithaca. The Cowbirds parasitized not only the Phœbes nesting under the railroad bridges, but elsewhere as well.

Persons wanting to attract birds to their gardens and have them nest there should destroy all Cowbird eggs found, and, if so inclined, destroy Cowbird eggs or young anywhere, but to proclaim the Cowbird an economic outlaw and persecute it accordingly would be a serious mistake. It would involve upsetting the delicate balance of nature more seriously than we might suppose. Species that are now beneficial to the agriculturist might increase to a dangerous extent were the Cowbird removed. It is a matter of common knowledge that any species, if unduly common, becomes an economic menace because it tends to outstrip its available natural food supply. The Cowbird is one of the most efficient single checks on the undue increase of a large number of species.

The danger of the Cowbird lies with the uncommon species. Birds of low numerical status are, in a sense, the failures of nature. Some of them may be slowly dying out; others may be just holding their own, but to these species the Cowbird can become a very real source of danger. These birds should be helped by man and Cowbird eggs or young indiscriminently destroyed when found in their possession. Of course uncommon birds are relatively uncommonly parasitized, but in the case of rare species each individual nest is a matter of far more importance than a number of nests of an abundant one.

There is little danger of the Cowbird ever seriously decreasing the numbers of the common sparrows, warblers, vireos, etc., because the status of the Cowbird of necessity must vary with the combined status of its common victims. If the victims become scarcer there are fewer nests available for the Cowbirds; hence, fewer Cowbirds are raised and, as the food supply is greater than the needs of the birds, both the victims and the Cowbirds raised will have less of a struggle for existence, a greater per cent of both will survive, and the status of both quickly come back to the limits of the available food supply.

In conclusion we may say that the Cowbird may well be dispensed with locally but that on the whole it plays a very real and important part in the general scheme of nature, and consequently should not be outlawed. Because of the harm it does the Cowbird should not be granted protection. Legally it may best be left alone.

The Enemies of the Cowbird

The enemies of the Cowbird are of two main types—predacious mammals and birds, and parasitic invertebrates.

During the spring migration the Cowbirds pass the night in the marshes and at such times are probably subject to attack from mink and weasels, as well as from Marsh, Coopers, Sharp-shinned, and Pigeon Hawks which sometimes attack Red-winged Blackbirds. I know of but one definite record of any of these hawks and mammals actually killing Cowbirds and have found no identifications of Cowbirds bones in the pellets of any of the raptores. In the one case I know of, a Marsh Hawk had killed and eaten a female Cowbird. This was reported to me by Mr. W. D. W. Miller. However, as these hawks occasionally take Red-wings, and as the Cowbirds are closely associated with the Red-wings in the marshes, they doubtless suffer to some extent from the attacks of predacious hawks and mammals.

G. B. Grinnell, in Ludlow's Report of a reconnaissance of part of Montana, (1876, p. 83), writes as follows of the Prairie Falcon.

"While at Camp Baker, a bird of this species used to fly over our camp every morning to a corral just beyond, where he would secure a Blackbird or two for breakfast. . . . ." The Blackbirds in question probably were Cowbirds. Cowbirds were common in that region and they would be more apt to be found in corrals than any of the other Blackbirds.

The eggs of the Cowbirds are subject to all the dangers and enemies that beset the eggs of most birds—egg-eating animals such as squirrels, Blue Jays, and House Wrens; to some extent Marsh Wrens; black snakes and, for that matter, in some degree almost all of the common snakes. Added to these are two other sources of danger unique among North American birds. First, the possibility of the host species destroying the eggs of the parasite either by deserting the nest or by covering over, smashing, or pitching them out. Second, the great number of bird-students and bird-lovers who invariably, and not without some reason, throw out Cowbird eggs whenever they find them.

The last named enemy also affects nestling Cowbirds and in regions where nature study is commonly indulged in, this class of enemies is of no small importance as a check upon the species.

Quite different in their relations to the Cowbird are the insect parasites living among the feathers and the parasitic worms of its intestinal tract.

The Cowbird seems to be singularly free from insect parasites. A single species of mallophagan has been recorded a single time from the Cowbird. This mallophagan, *Docophorus transpositus,* was taken from a female Cowbird at Lawrence, Kansas, and proved to be a new species. This is the only definite record I know of an insect parasite on the Cowbird.

Shufeldt (Am. Nat. XV No. 4 April 1881, p. 283) once picked up a nearly full grown female Cowbird that could barely hop along and was totally unable to fly, extremely emaciated and ill-nourished. On parting the feathers he, "discovered the integument in various localities, particularly the wings and breast, raised up in rather a tent-like manner, in some eighteen or twenty places. Each of these little pockets was occupied by a yellowish-white larva as large as an ordinary white garden bean." These he removed, one by one, with a piece of straw, and carried the bird, ". . . . apparently now much relieved, to the nearest water, some little distance, where she drank as if she had never beheld that fluid before. My surprise now was not very great when, upon releasing her, I found that she could fly some little distance, and undoubtedly subsequently entirely recovered.

As I have never seen a similar case, I am to this day ignorant of the habits or even the name of the parasite." Since the identity of this insect parasite has never been determined, the list of insects definitely known to affect the Cowbird remains but one name long, and that based on a single occurrence—*Docophorus transpositus.*

Young Cowbirds reared in Phœbe's nests are probably sometimes affected by the lice and other insects abounding in many of those nests, but we have no data on this subject.

Two intestinal parasites are known from the Cowbird,—both being tænoid cestodes: *Biuterina trapezoides* and *Tænia urnigera.* (Ranson, Bull. 69, U.S.N.M., 1909, p. 115). On one occasion I found tape worms in the intestine of a Cowbird but they accidentally spoiled before I could have them identified.

In captivity the Cowbird sometimes suffers from a bacterial infection of the toes. This causes the toes to swell enormously, the swellings being full of pus. I had one such case among some captive Cowbirds at Ithaca.

MISCELLANEOUS BEHAVIOR

Sleeping and Roosting

The sleeping habits of the Cowbird may be divided into three types. The migrating birds in spring and fall associate with the Red-winged Blackbirds and descend with them into the reeds and cat-tails to sleep. The resident birds, once established in definite places, sleep on the highest branches of the tallest trees in their respective territories. I have seen them perched on their trees at dusk and have never found them in the marshes with the migrants.

Along in late August and September the Cowbirds gather into large flocks sometimes containing several thousand individuals, and often form definite roosts to which they return every night. These roosts are usually mixed; i.e., contain Grackles, House Sparrows, Starlings, and sometimes Purple Martins and Crows in addition to Cowbirds. During the first three weeks of August many Cowbirds roost in the cat-tails with other blackbirds. Bailey, in Oklahoma, witnessed such an occurrence on August 12-14, 1906; in that particular case flocks of Cowbirds were noticed at sunset passing down to the lake with Brewer Blackbirds.

The roosts sometimes begin as early as the middle of June. Henninger (Wils. Bull. 1906, p. 54) writes of such a one in Ohio. "From the middle of June until the end of August, 1905, there was a Cowbird roost on Jefferson Street, and as I sat in front of my house every evening I could see at first the five or more advance scouts coming in and circling around for a while, until they settled. Then came troops numbering from twenty to forty while over them at right angles, enormous flocks of Grackles would fly to their roost at the Heidelberg University campus. From the end of August on, however, they deserted their own roost and joined the Grackles on the campus. In the fall they often mingled with the Bobolinks, while in the spring they prefer the company of the Grackles and Red-wings."

Lynds Jones found that Cowbirds used Grackle roosts in the spring also. In his detailed study of the Oberlin Grackle roost (Wils. Bull. 1897, pp. 35-56) he recorded many Cowbirds. He found that in the evening,

> Cowbirds began to put in an appearance even earlier than the Grackles, but none ventured into the trees at first. They came from the southeast in companies of from five to ten individuals, avoided the trees of the roost and settled in the grove on the west side of the campus. At 7:00 more than fifty Cowbirds from these trees came dashing into the roost and disappeared at once. A little later a smaller company dashed in. From this time the Cowbirds flew directly to the roost without molestation from the Grackles; previously the Grackles had resisted attempts to share the roost with them. None of the Cowbirds were singing and but few uttered the whistling note. There were about one hundred Cowbirds. . . . .

Just as the Cowbirds were the first to appear in the evening, they were the last to leave in the morning. The Grackles began to leave the roost at 3:31 A.M. The first Cowbirds were seen to leave the trees at 3:45 A.M.

> The last company of about a dozen Cowbirds was driven out by four old Grackles about 4:00. All the birds seemed to be singing up to the last ten minutes before the trees were entirely deserted. The Cowbirds, however, were not heard at all until 3:45 when but few Grackles remained.

They may sleep or rather doze in normal posture with the nictitating membrane drawn. Usually the head is turned and bill tucked under the interscapulars, although sometimes the turning is less complete and the bill rests on the bend of the wing.

During the heat of the day Cowbirds, like most other birds are very inactive and if not really asleep, are at least not wide awake. They perch quietly in the shaded parts of the trees and are very easily overlooked. Vernon Bailey noted that at Eagle Lake, Texas, in November, 1904, great numbers of Cowbirds hid during the hot part of the day in the Cherokee rose hedges and were safe among the thorns from most of their enemies.

Fights With Other Birds

Cowbirds do not seem to attack other birds nearly as much as do Red-wings. It is not an uncommon thing to see a Red-wing pursuing a Crow or a Hawk while I know of but two instances where a Cowbird was seen chasing a Hawk and none of its pestering Crows. It may be that, having no nest of its own, it does not see in a Crow the nest enemy that most birds do.

A. H. Howell noticed a flock of Cowbirds chasing a small hawk in Texas (files Biological Survey). Lantz (Orn. and Ool., 1885, p. 29) writes that on "Oct. 11, 1884—Saw a large flock of Cowbirds in chase of a Red-tailed Hawk, though not so vigorously. He seemed anxious to avoid them, and often changed his course, but they pursued him until out of view."

I have seen a Robin drive away a pair of Cowbirds from a tree in which they were sitting. On one occasion I watched a pair of Cowbirds drive away a Wood Pewee, although in this case the fight was entirely vocal, no blows being delivered.

Length of Life

P. Chalmers Mitchell (P. Z. S., 1911, pp. 480-481) found that members of the genus *Molothrus* had an average duration of 65 months and a maximum of 145 months and that of all the passerine birds in the London Zoological Park, no other genus represented by an equal or greater number of specimens equalled the record set by this genus. The passeres in his notes were represented by 207 genera, 488 species, and 3224 individuals. A Bay-winged Cowbird (*Agelaioides badius*) lived in the park for over twelve years. The North American Cowbird was not represented in Mitchell's data but is doubtless similar in longevity to the rest of its group. Mr. Lee S. Crandall of the New York Zoological Park tells me that twelve to fifteen years is approximately the duration of life in our Cowbird.

As compared with the genus *Molothrus* we find the Red-wings (*Agelaius*) averaging 54 months to the 67 of the Cowbirds, and having a maximum of 94 months to the Cowbird's 145. However, there were only eight individuals of *Agelaius* to 25 of *Molothrus.*

FIELD MARKS AND RECOGNITION CHARACTERS

Under the heading come several disconnected notes. The characteristics that we use in identifying birds in the field are usually a rather unnatural assemblage of facts.

If one gets a good view of the bird the plumage is enough to distinguish it; the brown head and glossy greenish-black body of the male, the quite uniform gray of the female, or the streaked brownish gray of the young. The value of the song and call notes as a field character is touched upon under a discussion of those phases of the bird's life.

The things to be mentioned here are some of the idiosyncracies of the Cowbird that help to identify it when plumage and sound fail.

In flight the Cowbird resembles the Red-winged Blackbird very closely and is difficult to identify except at close range. Flocks of Cowbirds usually are more compact than are those of Red-wings and the individuals composing them do not sink and rise through the flock as they fly. In the case of the Red-wing the individuals undulate through the flock as they move onward. A bird will be on the top horizontal plane of the flock one minute, then sink to the bottom, at the same time moving with the flock, and then rise again. While the flock does not really undulate, each of its component individuals do, thereby giving it a very irregular appearance. The Cowbirds fly in a more orderly fashion, going fairly straight in their course without much vertical deviation. When flocks are mixed, i.e., contain Red-wings and Cowbirds, the smaller size of the latter together with this difference in flight often helps to identify them.

If one sees the birds alight on a tree, even so far off that the difference in size is completely lost and the birds all appear black, there is one peculiarity that serves to tell the Cowbird from the Red-wing. In my experience the Red-wing invariably pumps his tail up and down at least once on alighting and this the Cowbird never does. I have yet to see a Red-wing alight without doing this or a Cowbird do it. This motion, slight and fleeting as it is, is a great aid in telling the two apart and is visible at a greater distance than might be supposed. However all field identifications are quite restricted in their limits.

The Rusty Blackbird is often found with Red-wings and Cowbirds in the spring in the marshes. There should be little cause for confusing the Rusty and the Cowbird within reasonable distances. The relatively longer and slenderer bill and the longer tail of the Rusty give it a much longer and slenderer form than the comparatively short and stocky Cowbird.

Waxwings, when flying, bear considerable resemblance to Cowbirds and they fly without any undulation whatsoever but their wings are more pointed. In flight Waxwings approximate to some extent the bow-and-arrow shape of Starlings and the Cowbird bears no resemblance to the latter. Frequently Waxwings call as they fly and the wheezy quality of their note is sufficient to reveal their identity.

As mentioned in the discussion of the call-notes of the Cowbird, the feeding call is a harsh *chuck* very similar to that of the Red-wing. As this note does not carry far, the bird can usually be told by plumage when it is heard in the field. However on very still occasions in a poor light the bird can be told from the Red-wing because of its way of giving this note. The Red-wing jerks its tail and the lower part of the belly when giving its *chuck;* the Cowbird slightly jerks its breast and head as though the notes were a hiccough.

When on the ground the Cowbird is at once distinguished from the great majority of small birds by the fact that it *walks,* not *hops.*

Common Names

The Cowbird has been known in various parts of its range by a large number of names, while in the literature, this number is considerably increased by additions and by typographical variations. A list may be of interest.

1. Cowbird
   variations; Cow Bird, Cow-bird, Crowbird (probably a misprint).
2. Cowpen
   variations; Cow-pen
3. Cow-pen-finch
   variations; Cowpen Finch
4. Cow-pen Bunting.
5. Cowpen bird
   variations; Cow-pen Bird, Cowpen Bird, Cow-pen-bird, Cowpen-bird
6. Cow Bunting
   variations; Cowbunting
7. Cow Blackbird
8. Cow Troopial
   variation; Cow Troupial
9. Cow Oriole
10. Brown-headed Oriole
11. Brow-headed Starling (Dwarf Cowbird.)
12. Clodhopper
13. Shiney Eye
    variations; Shiney-eye, Shiny-eye
14. Lazy Bird
    variation; Lazy-bird
15. Shifty-bird
16. Parasite
17. Sheep-bird
18. Buffalo Bird
    variations; Buffalo-bird, buffalo-bird
19. Sheep-blackbird
20. Brown-headed Blackbird
21. Coffee-headed Blackbird
22. Blackbird
23. Prairie Blackbird
24. Little Blackbird
25. Cuckoo Bunt
26. Cuckold
27. Chuckold
28. Chucking Cowbird
29. Common Cowbird
30. Salt Bird
31. L'Etourneau Ordinaire
32. Le Petit Troupaile noir
33. Troupial, de la Caroline

34. Tordo
35. Tordito (Dwarf Cowbird)
36. Tongonito (*M. a. obscurus*)
38. Enmantecado (*M. a. obscurus*)

Spanish

38. Viehstaar
39. Kuhvogel

German

40. I-thick-wah- (Mohave Indian for Dwarf Cowbird)
41. A-ga-jid-as-sig-gi-nak (Chippewa Indian)
42. Pasu-um-pa-gun-suk (Goshute Indian) (literally translated — sand blackbird)
43. Dwarf Cowbird *(M. a. obscurus)*
44. Nevada Cowbird *(M. a. artemisiae)*
45. Sage-brush Cowbird *(M. a. artemisiae)*
46. Northwestern Cowbird *(M. a. artemisiae)*
47. California Cowbird *(M. a. californicus=obscurus)*
48. Kee Shdawr. (Pennsylvania German)
49. Northern Cowbird *(M. a. ater* in Austin, Texas, region)
50. Northwestern Cowbird *(M. a. ater* in Austin, Texas, region)
51. Large Cowbird *(M. a. ater* in Austin, Texas, region)
52. Buffalo-pecker (Lewis & Clark Exp.)

In this connection it may be noted that at least four species other than *Molothrus ater* have at one time or another gone under the name Cowbird. They are the Black-billed Cuckoo and Yellow-billed Cuckoo, both called Cowbird because of their notes which sound more or less like "coro-cow-cow, etc."; the Rose-colored Pastor (*Pastor roseus*) of Europe and a European Wagtail (*Motacilla raii*). The two Cuckoos have also been called "Kowbird."

SYNONYMY

Molothrus ater ater (Boddaert) Cowbird

Oriolus ater, Boddaert, Tabl. Pl. Enl., 1783, 37 (based on Troupial de la Caroline, Daubenton, Pl. Enl., p. 606, fig. 1).

(Molothrus) ater, Gray, Hand-list, ii, 1870, 36, no. 6,507.

Molothrus ater, Coues, Check List, 1873, 43, footnote; 2d ed., 1882, no. 313; Bull. U. S. Geol. and Geog. Surv. Terr., iii, 1877, 667 (N. Texas)—Ridgw., Nom. N. Am. Birds, 1881, no. 258; Proc. U. S. Nat. Mus., ix, 1886, 151 (Huexotitla, Puebla, crit.); Orn. Illinois, 1, 1889, 310—Brewster, Bull. Nutt. Orn. Club, iii, 1878, 123 (descr. young)—Merrill, Proc. U. S. Nat. Mus., 1, 1878, 130 (Fort Brown, Texas, winter res.)—Spelman, Bull. Nutt. Orn. Club, viii, 1883, 121 (Belmont, Mass., Jan. 2-2 spec.)—Chamberlain, Bull. i, N.H. Soc. N. B., 1882, 41 (New Brunswick, rare summer res.)—Damon, Auk, ii, 1885, 309 (Lockport, w. N.Y., winter)—Amer. Ornith. Union Check-List, 1886, no. 490 part.—Ferrari-Perez, Pros. U. S. Nat. Mus., ix, 1886, 151 (Huexotitla, Puebla, Nov.)—Cooke, Bird Migr. Miss. Val., 1888, 161 (dates, etc.)—Attwater, Auk, ix, 1892, 237 (San Antonio, Texas; breeding?)—Bendire, Rep. U. S. Nat. Mus., 1893, 590, pls. 1, 2, 3 (descr. syn., range, habits); Life Hist. N. Am. Birds, ii, 1895, 590, pl. 6, figs. 3-6, part.—Spaulding, Auk, xii, 1895, 182 (Lancaster, N. Hamp., Jan. 18)—Nehrling, Our Native Birds, etc., ii, 1896, 240, pl. 17, figs. 2, 3—Knight, Bull. 3, Univ. Maine, 1897, 86 (Maine, summer res.)—Fleming, Auk, xviii, 1901, 40 (Ont.)—Howell, Auk, xviii, 1901, 342 (Mt. Mansfield, Vt.)—Widmann, Auk, xix, 1902, 234 (Wequetonsing, Mich.)—Henninger, Wils. Bull., ix, n.s., 1902, 86 (Ohio); Stone, Cassinia, vi, 1902, p. 46 (eggs); Swales, Wils. Bull., x, n.s., 1903, p. 22 (wintering in Mich.); Smith, Wils. Bull., x, n.s., 1903, p. 54 (Georgia, winter); Keim, Cassinia, viii, 1904, p. 39; Stone, Cassinia, vii, 1904, p. 57; Hoffman, Guide to the Birds of New England and New York, 1904, p. 192; Chapman, Handbook Birds E. N. Am., 1904, 262—Williams, Auk, xxi, 1904, 457 (Leon Co., Fla., winter)—Allison, Auk, xxi, 1904, 479 (W. Baton Rouge Parish, La.)—Eifrig, Auk, xxi, 1904, 242 (Md.)—Comey, Wils. Bull., xi, n.s., 1904, 7 (N. Hamp.): Stone, Cassinia, ix, 1905, p. 52; Rhoads and Pennock, Auk, xxii, 1905, 201 (Delaware)—Kopman, Auk, xxii, 1905, 142 (Jefferson Parish, La.)—Wood and Frothingham, Auk., xxii, 1905, 49 (Au Sable Valley, Mich., breeding)—Porter, Wils. Bull., xi, n.s., 1904, 98—Holmes, Wils. Bull., xii, n.s., 1905, 11—Hix, Wils. Bull., xii, n.s., 1905, 39—Hann, Wils. Bull., xii, n.s., 1905, 120—Wilson, Wils. Bull., xiii, n.s., 1906, 5 (Iowa)—Henninger, Wils. Bull., xii, n.s., 1906, 54—Hall, Wils. Bull., xiii, n.s., 1906, 125—Hunn, Auk, xxiii, 1906, 422—Fleming, Auk, xxiv, 1907, 78 (Toronto, Can.)—Holmes, Wils. Bull., xiv, n.s., 1907, 24—Traverner and Swales, Wils. Bull., xiv, n.s., 1907, 144—Pennock, Cassinia, xi, 1907, 41—Hunt, Cassinia, xi, 1907, 52—Stone, Birds of New Jersey, 1908, 209—Woodruff, Auk, xxv, 1908, 202 (Shannon and Center Co., Mo., breeding)—Hess, Auk, xxvii, 1910, 26 (Illinois)—Wood, Auk, xxvii, 1910, 39 (Wayne County, Michigan)—Chaney, Auk, xxvii, 1910, 275—Embody, Auk, xxvii, 1910, 173—Jones, Wils. Bull., xvii, n.s., 1910, 32 (habits)—Kohler, Wils. Bull., xvii, n.s., 183 (New Jersey)—Kohler, Wils. Bull., xvii, n.s., 1910, 191 Essex County, New Jersey; status, habits, victims, etc.)—Lacey, Auk, xxviii, 1911, 212 (Kerrville, Texas; winter)—Nichols, Murphy, and Griscom, Auk, xxxiv, 1911, 442—Pennock, Wils. Bull., xvii, n.s., 1911, 38 (North Carolina; winter)—Kohler, Wils. Bull., xix, n.s., 1912, 113—Kohler, Wils. Bull., xx, n.s., 1913, 78—Harlow, Auk, xxxv, 1918, 137—Wetmore, Auk, xxxvii, 1920 (Lake Burford, New Mexico; habits), p. 402.

M(olothrus) ater, Coues, Key N. Am. Birds, 2d ed., 1884, 402—Ridgway, Man. N. Am. Birds, 1887, 367.

Molothrus ater, Anderson, Birds of Iowa, 1907, 299.

Molathnusater, Dickey, Oologist, xxxii, 1914, 160.

Molathrus ater, Dove, Emu., xix, 1920, 304.

(Fringilla) pecoris, Gmelin, Syst. Nat., i, 1788, 910 (female; based on *Fringilla pecoris* Brisson, Orn., iii, 165, etc.)—Latham, Index Orn., ii, 1790, 443.

F(ringilla) pecoris, Lichtenstein, Verz. Doubl., 1823, 23.

Emberiza pecoris, Wilson, Am. Orn., ii, 1810, 145, pl. 18, figs. 1, 2, 3

E(mberiza) pecoris, hoads, reprint of Ord's N. Am. Zool., 1894, 316.

Emberiza pecora, James, Long's Exp. Pittsburgh to the Rocky Mountains, ii, 1823, 199, footnote, part (?).

Passerina pecoris, Vieillot, Nouv. Dict. d'Hist. Nat. xxv, 1819, 22.

Icterus pecoris, Bonaparte, Journ. Ac. Nat. Sci., Phila., 1824; Ann. Lyc. N.Y., ii, 1828, 53—Nuttall, Man. Orn. U. S. and Can., i, 1832, 178—Audubon, Orn. Biog., i, 1831, 493, pl. 99; v, 1839, 233, 400, pl. 424 part.—Peabody, Report Orn. Mass., 1838, 283.

Ps(arocolius) pecoris, Wagler, Syst. Av., 1827, *Psarocolius,* sp. 30, part; Isis, 1831, 527.

(?) *Agelaius pecoris,* Swainson, Philos. Mag., n.s., i, 1827, 436.

Molothrus pecoris, Swainson, Fauna, Bor.-Am., ii, 1831, 277—Bonaparte, Geog. and Comp. List, 1838, 29—Audubon, Synopsis, 1839, 139; Birds Am., Oct. ed., iv, 1842, 16, pl. 212—Baird, Rep. Pacific R.R. Surv., ix, 1858, 524, part; Cat. N. Am. Birds, 1859, no. 400; Sclater, Zool. Soc. Lond., 1859, 365 (Jalapa, Vera Cruz); Cat. Am. Birds, 1862, 134, part; Cat. Birds Brit. Mus., xi, 1886, 333, part (Cozumel I, Yucatan; Jalapa, Vera Cruz, etc.)—Verrill, Proc. Essex Inst., iii, 1862, 151 (Oxford, Co., Maine, breeding)—Cassin, Proc. Ac. Nat. Sci., Phila., 1866, 17, part (monogr.)—Tripp, Am. Nat., iii, 1869, 291 (biography)—Coues, Check List, 1873, no. 211; Baird, Brewer, and Ridgway, Hist. N. Am. Birds, ii, 1874, 154, part, pl. 32, figs. 6, 7—Gentry, Proc. Ac. Nat. Sci. Phila., 1874, 96 habits). Maynard, Birds E. N. Am., 1881, 131—Bicknell, Auk, ii, 1885, 152 (song)—Salvn and Godman, Biol. Centr.-Am., Aves, i, 1886, 450 part.

Molothrus pecoris, Holder, Trans. Ill. Nat. Hist. Soc., 1862, 82.

(Molothrus) pecoris, Bonaparte, Consp. Av., i, 1850, 436—Coues, Key N. Am. Birds, 1872, 155—Sclater and Salvin, Nom. Av. Neotr., 1873, 37.

M(olothrus) pecoris, Cabanis, Mus. Hein., i, 1851, 192.

Molobrus pecoris, Sundevall, Meth. Av. Nat. Disp. Tent., 1872, 22.

(?) *(Oriolus) fuscus,* Gmelin, Syst. Nat., i, 1788, 393 (based on *Brown-headed Oriole* Pennant, Arct. Zool., ii, 260).

(?) *(Oriolus) minor,* Gmelin, Syst. Nat., i, 1788, 394 (based on *Petit Troupaile noir* Buffon, Hist. Nat. des Ois., iii, 221).

Fringilla ambigua, Nuttall, Man. Orn. U. S. and Canada, 1, 1832, 484 (young).

Icterus emberizoides, "Bosc." Daudin, Traite Orn., ii, 1800, 350 (*Oriolus fuscus* Gmelin).

(Molothrus pecoris), a. Subsp. *typica* Sclater, Cat. Birds Brit. Mus., xi, 1886, 334, in list of specimens.

Molothrus ater ater, Ridgway, Birds N. and Middle Am., ii, 1902, 207—Barrows, Mich. Bird Life, 1912, 434 (habits, distr., etc., in Mich.). Sage and Bishop, Birds of Conn., 1913, 110 (Conn.)—Brewster, Birds Cambr. Region, 1906, 240—Townsend, Birds Essex Co., 1905, 244; Wood, Wils. Bull., 1911, 99; Jones, Wils. Bull., 1912, 173 (Lake Erie Islands); Phillips, Auk, xxviii, 1911, 87 (Tamaulipas, Mexico, Nov. 26); Bailey, Auk, xxix, 1912, 82 (Virginia); Harlow, Auk, xxix, 1912, 473 (Pa.)—Smyth, Auk, xxix, 1912, 519 (Virginia); Chapman, Handbk. Birds E. N. Am., 1912, 359; Stone, Auk. xxx, 1913, 34; Hathaway, Auk, xxx, 1913, 554 (R.I.)—Tinker, Auk, xxxi, 1914, 79 (Iowa)—Cooke, Auk, xxxi, 1914, 482 (Oklahoma, winters)—Eaton, Birds N.Y., 1914, ii, 225 (habits, status, etc., in N.Y.)—Fry, Auk, xxxiii, 1916, 35 (song)—Mousley, Auk, xxxiii, 1916, 168

(Quebec). Smith, Auk, xxxiii, 1916, 190 (Kerr Co., Texas)—Stubbs, Auk, xxxii, 1916, 201 (Lynn, Mass., winters)—Eifrig, Auk, xxxvi, 1919, 520—Latham, Auk, xxxvii, 1920, 306 (Long Island, N.Y., winters)—Tyler, Auk, xxxvii, 1920, 584 (song)—Hunt, Auk, xxxviii, 1921, 378 (Arkansas)—Horsey, Auk, xxxix, 1922, 81 (Kentucky)—Wilson, Auk, xxxix, 1922, 237 (Kentucky)—Corrington, Auk, xxxix, 1922, 547 (Biloxi, Miss., wintering).

Molothrus ater ater, Bailey, Birds of Virginia, 1913, 276.

Molothrus a. ater, Griscom, Auk, xxxvi, 1919, 588 (Leon Co., Fla., Mar. 27).

Cassius pecoris, Bibliografia ornitologica, Hornero, III, 1923, p. 221.

Molothrus ater artemisiæ

Molothrus ater artemisiæ, Grinnell, Univ. Cal. Publ. Zool., v. 1909, 276 (orig. descr.), Taylor, Univ. Cal. Publ. Zool., vii, 1912, 380 (northern Nevada). Grinnell, Pac. Coast Avifauna 8, 1912, 20; Auk, xxi 1912, 386; Oberholser, Auk, xxxiv, 1917, 327; Dice. Auk, xxxv, 1918, 149 (s. e. Washington) Oberholser, Auk, xxxv, 1918, 209.

Molothrus ater dwighti, Bishop, Auk, xxvii, 1910, 61—Auk, xxix, 1912, 386.

Molothrus ater, Baird, Orn. Simpson's Exp., 1876, 379 (Utah)—Ridgway, Field and Forest, 1877, 208 (Colorado)—Am. Ornith. Union, Check List, 1886, no. 495, part—Seton, Auk, iii, 1886, 321 (western Manitoba, summer)—Thompson, Proc. U. S. Nat. Mus., xiii, 1891, 571 (Manitoba)—Bendire, Rep. U. S. Nat. Mus., 1893, 590, part—Life Hist. N. Am. Birds, ii, 1895, 590, part—Brooks, Auk, xvii, 1900, 106 (Brit. Columbia, both sides of Cascades)—Currier, Auk, xxi, 1904, 37 (Leech Lake, Minn., breeding)—Snodgrass, Auk, xxi, 1904, 229 (central Washington)—Bowles, Auk, xxiii, 1906, 145 (Tacoma, Wash., rare summer resid.)—Cameron, Auk, xxiv, 1907, 396 (Custer and Dawson Co., Montana, breeding)—Seton, Auk, xxv, 1908, 71—Bent, Auk, xxv, 1908, 28 (s.w. Saskatchewan)—Reagan, Auk, xxv, 1908, 466 (S. Dak.)—Stansell, Auk, xxvi, 1909, 396 (central Alberta)—Jewett, Auk, xxvi, 1909, 7 (Baker Co., Oregon)—Visher, Auk, xxvi, 1909, 149 (S.Dak.)—Ferry, Auk, xxvii, 1910, 199 (Saskatchewan)—Visher, Auk, xxviii, 1911, 13—Saunders, Auk, xxviii, 1911, 40 (Gallatin Co., Montana)—Isely, Auk, xxix, 1912, 32 (Sedgwick Co., Kansas)—Taverner, Auk, xxxvi, 1919, 253 (Alberta)—Preble, N. Am. Fauna 27, 1908, 407 (Athabaska, Mackenzie).

Molothrus ater, Traverner, Can. Alpine Journ., ix, 1918, 66—Can. Field Nat. 1919, 13.

Molothrus ater, Roberts and Benner, Bull. Nutt. Orn. Club, v, 1880, 15.

Melanothrus ater, Grinnell, Pac. Coast Avifauna 11, 1915, 101 (in synonymy).

Molothrus ater ater, Widmann, Auk, xxviii, 1911, 314 (Estes Park, Colorado)—Visher, Auk, xxix, 1912, 110 (n.w. S.Dak.)—Rockwell and Wetmore, Auk, xxi, 1914, 320 (Col.)—Warren, Auk, xxxiii, 1916, 307 (Elk Mt., Col.)—Brooks, Auk, xxxiv, 1917, 43 (Brit. Columbia)—Lowe, Auk, xxxiv, 1917, 455 (Col.)—Jensen, Auk, xxxv, 1918, 347 (N.Dak., breeding)—Burleigh, Auk, xxxviii, 1921, 558 (Montana).

Molothrus a. ater, Visher, Wils. Bull., xix, 1912, 4 (S. Dak.).

Molothrus ater . . . . ater Ridgway, Orn. 40th Parallel, 1877, 501 (upper Humboldt Valley, Nevada, Aug. 31; Truckee Reservation, Nevada, June; Parleys Park, and Bear River Valley, Utah, June).

Molothrus pecoris, Baird, Rep. Pacific R.R. Surv., ix, 1858, 524, part; Cassin, Proc. Ac. Nat. Sci. Phila., 1866, 17, part—Cooper, Orn. Cal., 1870, 257—Coues, Birds

N. W., 1874, 180, part—Henshaw, Zoöl. Exp. W. 100th Merid., 1875, 312, part (Provo, Utah; Denver and Pueblo, Col.).

(Molothrus pecoris) a. pecoris, Coues, Birds. N.W., 1874, 80, part (in synonymy).

Molothrus pecorus, a. Subsp. *typica* part, Sclater, Cat. Birds. Brit. Mus., xi, 1886, 334 in list of specimens (one from fort Bridger, Utah.)

(Molothrus) pecoris, Gamble, Journ. Ac. Nat. Sci. Phila., i, 1847, 49 (New Mexico and Calif.).

Molothrus pecoris, Baird, in Ive's Rept. Col. River of the West, pt. v, Zoology, in House Exec. Documents, 36th Congress, 1st session, vol. 14, 1860, 6 (part ?).

Emberiza pecora, James, Comp. Long's Exp. Pittsburgh to Rocky Mts., ii, 1823, 199, footnote, part.

Molothrus ater obscurus

(Sturnus) obscurus, Gmelin, Syst. Nat., i, pt. 2, 1788, 804 (based on *Sturnus novæ hispaniæ* Brisson, Orn., ii, 448).

Molothrus obscurus, Cassin, Proc. Ac. Nat. Sci. Phila., xviii, 1866, 18 (monogr.; Miraflores, Lower California; Colima and Manzanillo, W. Mexico)—Cooper, Orn. Cal., 1870, 260 (Cape St. Lucas; s. Arizona; n.w. Mexico)—Brewer, Bull. Nutt. Orn. Club, iv, 1879, 123 (Fort Brown, Texas, descr. eggs).

(Molothrus) obscurus, Gray, Hand-list, ii, 1870, 36, no. 6,508.

(Molothrus pecoris), Var. *obscurus,* Coues, Key N. Am. Birds, 1872, 155—Henshaw, Zool. Exp. W. 100th Merid., 1875, 312 (Gila R., Arizona).

Molothrus pecoris, ... var. *obscurus,* Coues, Check List, 1873, no. 211a—Henshaw, Rep. Orn. Spec. Wheeler's Surv., 1873 (1874), 160 (s. Arizona).

Molothrus pecoris, var. *obscurus,* Baird, Brewer, and Ridgway, Hist. N. Am. Birds, 1874, ii, pl. 32, fig. 8—Lawrence, Mem. Bost. Soc., N.H., ii, 1874, 280 (Mazatlan; Manzanillo Bay; habits); Bull. U. S. Nat. Mus., no. 4, 1876, 24 (Tehuantepec City, Oaxaca, Oct.).

(Molothrus pecoris,) b. *obscurus,* Coues, Birds, N.W., 1874, 180 (synonymy).

Molothrus pecoris, Baird, in Ive's Rept. Col. R. of the West, pt. v, Zool. in House Exec. Documents, 36th Congress, 1st session, vol. 14, 1860, p. 6 (part ?).

(Molothrus) ater var. *obscurus,* Coues, Birds N.W., 1874, 180, in text.

Molothrus ater, var. *obscurus,* Merrill, Proc. U. S. Nat. Mus., i, 1879, 130 (Fort Brown, Texas; summer resid.).

Molothrus ater obscurus, Coues and Sennett, Bull. U. S. Geol. and Geag. Surv. Terr., iv, 1878, 22 (Brownsville, Texas; habits)—Sennett, Bull. U. S. Geol. and Geog. Surv. Terr., v, 1879, 396 (Lometa, Texas, habits, descr. eggs, etc.)—Ridgway, Proc. U. S. Nat. Mus., iii, 1880, 182, 218, 232; Nom. N. Am. Birds, 1881, no. 258a—Coues, Check List, 2d ed., 1882, no. 314—Brown, Bull. Nutt. Orn. Club, vii, 1882, 40 (Boerne, Kendall Co., Texas, Jan., Feb.)—Nehrling, Bull. Nutt, Orn. Club, vii, 1882, 166 (Houston, Texas, breeding)—Brewster, Bull. Nutt. Orn. Club, vii, 1882, 200 (Tucson and Santa Rita Mts., Arizona)—Belding, Proc. U. S. Nat. Mus., v, 1883, 546, 547 (San Jose del Cabo, Lower California); vi, 1883, 343 (Guyamas, Sonora)—Am. Ornith., Union Check List, 1886, no. 495a—Ferrari-Perez, Proc. U. S. Nat. Mus., ix, 1886, 151 (Puebla, Nev.)—Scott, Auk, iv, 1887, 22 (Riverside, Tucson, Florence, etc., Arizona)—Cooke, Bird Migr. Miss. Val., 1888, 162 (Tom Green and Concho Counties, Texas; summer)—Mearns, Auk, vii, 1890, 257 (Mogollon Mts., Arizona, summer)—Attwater, Auk, ix, 1892, 237 (San Antonio, Texas)—Bendire, Rep. U. S. Nat. Mus., 1893, 597 (geog. range, habits, etc.)—Life Hist. N. Am. Birds, ii, 1895, 441, pl. 6, figs. 7, 8—Hollister, Auk, xxv, 1908, 460 (Needles, Calif.)—Visher, Auk, xxvii, 1910, 283 (Arizona, Pima County)—Willet, Pacific Coast Avifauna 7, 1912, 70—Grinnell, Pac. Coast Avifauna, 8, 1912, 20; Sloanaker, Wils. Bull., 1913, 196—Swarth, Pac. Coast Avifauna 10, 1914, 47.

Molothrus ater californicus, Dickey and Van Rossem, Condor, xxiv, 1922, 308.

GENUS TANGAVIUS

Parasitic Cowbirds with the three outer primaries incised on their inner webs, the feathers of the mantle enlarged in the males to form a distinct cape, and with the plumage of the neck and breast somewhat hairlike.

Two Species and Four Races

KEY TO THE SPECIES

A. Body silky brown with golden reflections ....*T. armenti*.*
AA. Body not silky brown, no golden reflections ....*T. aeneus*

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* Female of *armenti* unknown.

VII

TANGAVIUS ARMENTI

Arment's Cowbird

This Cowbird is one of the rarest birds in the world being known from only four specimens, only one of which is fully adult. Needless to say, absolutely nothing is known of its life history. The specimens are as follows: an adult male in the American Museum of Natural History, New York, from Savanilla, Colombia, and three immature birds in the Berlin Museum from Cartagena, Colombia. In the Catalog of Birds of the British Museum, vol. 11, 1886, p. 335, there is listed under this species a juvenal female, but the identification is admitted to be uncertain. It is recorded as from Venezuela. The specimen came into the possession of the British Museum from the Sclater collection. In Sclater's Catalog of American Birds (1862, p. 135) this same specimen is listed as follows: "Molothrus— ? (ins. Trinitat ?)." So then it seems that not only is the indentification uncertain but the locality is equally indefinite. Although I have not seen the specimen I feel that it is probably not *Tangavius armenti.* Cassin (Proc. Ac. Nat. Sci. Phil., 1866 p. 10) lists a young *armenti* from "Demarara" in the collection of the Philadelphia Academy. Demarara is in British Guiana, a long way from Cartagena and the record seems doubtful for that reason. Doctor Witmer Stone informs me that there is no specimen of *T. armenti* in the collection of the Philadelphia Academy and that he has no recollection of such a specimen. It seems therefore that the bird in question was probably a young *Molothrus bonariensis minimus* judging by locality. In this connection it is noteworthy that Cassin gave as the range of *T. armenti* "Savanilla, New Granada" (Colombia) although the only specimen he listed as in the Philadelphia museum was labelled Demarara. The Savanilla record is based on the adult male in the Lawrence collection in the American Museum of Natural History, New York. It looks as though Cassin was not too sure of the identity of his young *"armenti"* and I feel that it was incorrect.

The range of the species as far as known is the Cartagena district of Colombia (Savanilla and Cartagena).

Through the courtesy of Mr. W. DeW. Miller of the American Museum of Natural History, New York, I have had the opportunity of examining the adult male in the collections of that institution. So far as I know this is the only adult specimen in existence.

Head, mantle, back, throat, breast, and abdomen lustrous silky dark clove-brown with golden brown reflections; the feathers of the rump and the under tail-coverts washed with purple; primaries dark brown externally washed with steel green; secondaries and greater coverts steel green, the innermost ones washed with purplish; middle and lesser coverts dark metallic purple with golden brownish bronze reflections; tail feathers metallic dark steel blue with purplish reflections; the feathers of the mantle elongated to form a cape but not to the extent that is found in *Tangavius aeneus* but more than in *Molothrus*. In respect to the development of the cape *armenti* is much nearer to *T. aeneus* than to any species of *Molothrus* but is a fairly good intermediate link between the two genera. Wing 98 mm., tail 71 mm., culmen, from base 18.5 mm., height of bill at base 9 mm., tarsus 22 mm.

Cabanis (Jour. f. Orn., 1861, p. 82) describes the three young birds from Cartagena in the Berlin Museum as follows:—They are dark rusty brown (like the head of *Molothrus ater*) but brighter on the throat; wings and tail brownish but here and there with a blue-green shimmer. They are smaller than *M. ater* and resemble them in the brownish color but the bill is not so high and is unmistakably longer and stronger in form. Some of the feathers on the breast of one of the birds are freshly molted and show the characteristic earth-colored gloss of *Tangavius æneus*. (Translated literally but the scientific names modernized.)

Judging by the single specimen (adult) examined, *T. armenti* seems to have the weakest feet and bill of all the Cowbirds. (This is not in agreement with what Cabanis writes of the young!) From *T. aeneus* it differs also in the incision of the outer primaries. In *T. aeneus* the three outermost primaries are deeply incised, the incision being sharp and angulated, while in *T. armenti* the outermost primary is very slightly incised but the next three are deeply and angulately emarginated.

SYNONOMY

Molothrus armenti, Cabanis, Mus. Hein., vol. 1, 1851, p. 192 et Journ. f. Orn., 1861, p. 82; Cassin Proc. Ac. Nat. Sci. Phila., 1866, p. 18; Sclater Ibis, 1884, p. 6; et Cat. Birds. Brit. Mus., vol. 11, 1886, p. 135; Brabourne and Chubb, Birds S. Amer., 1912, p. 434.

Tangavius armenti, Friedmann, Auk, 1927, p. 506.

VIII

TANGAVIUS AENEUS

The Red-eyed Cowbird

KEY TO THE SUBSPECIES OF TANGAVIUS AENEUS

A. Wings and tail with a vivid metallic sheen...........adult males
  B. Back and rump alike; bronze color........*T. a. involucratus*
  BB. Back bronze color; rump violaceous ....
    C. Wing over 112 mm. ....*T. a. aeneus*
    CC. Wing under 112 mm. ....*T. a. assimilis*
AA. Wings and tail with no vivid metallic sheen.....females and young
  B. General color very dark sooty gray or blackish.
    C. Wings and tail slightly glossed with bluish green ....
    ....*T. a. involucratus* ad. female
    CC. Wings and tail not glossed........*T. a. involucratus* yg. male
  BB. General color not very dark; sooty gray
    C. Upper parts faintly glossed; feathers of back with darker centers
    ....*T. a. aeneus* ad. female
    CC. No gloss above; feathers of back with no darker centers.
      D. Underparts indistinctly streaked with pale yellowish gray
      ....*T. a. aeneus* yg. male
      DD. Underparts unstreaked........*T. a. involucratus* yg. female

NOTE. I have not seen any adult females or young of *T. a. assimilis* but they probably differ from the corresponding plumages of *T. a. æneus* in size only, the ratio being relatively the same as given for the adult males. I have also not seen any young females of *T. a. æneus.*

GEOGRAPHIC RANGE

The range may best be treated under each subspecies.

a. Tangavius aeneus aeneus.

The typical form of the species, the so-called Bronzed Cowbird is a bird of the lowlands of western Mexico, being found in the states of Sonora (Hermosilla and Opodepe) and Sinaloa (Culiacan, Mazatlan), and in the territory of Tepic (San Blas, Acaponeta). It also occurs in southern Arizona, where it has been found breeding around Sacaton, but it is not a common bird anywhere north of the Mexican border. In Mexico its range is limited in an eastward direction by the western limits of the high table-land plateau of central Mexico. Very little has been recorded of this bird in the greater part of its range and it is impossible to give any details of its distribution or local status.

Type Locality—Mexico

b. Tangavius aeneus involucratus.

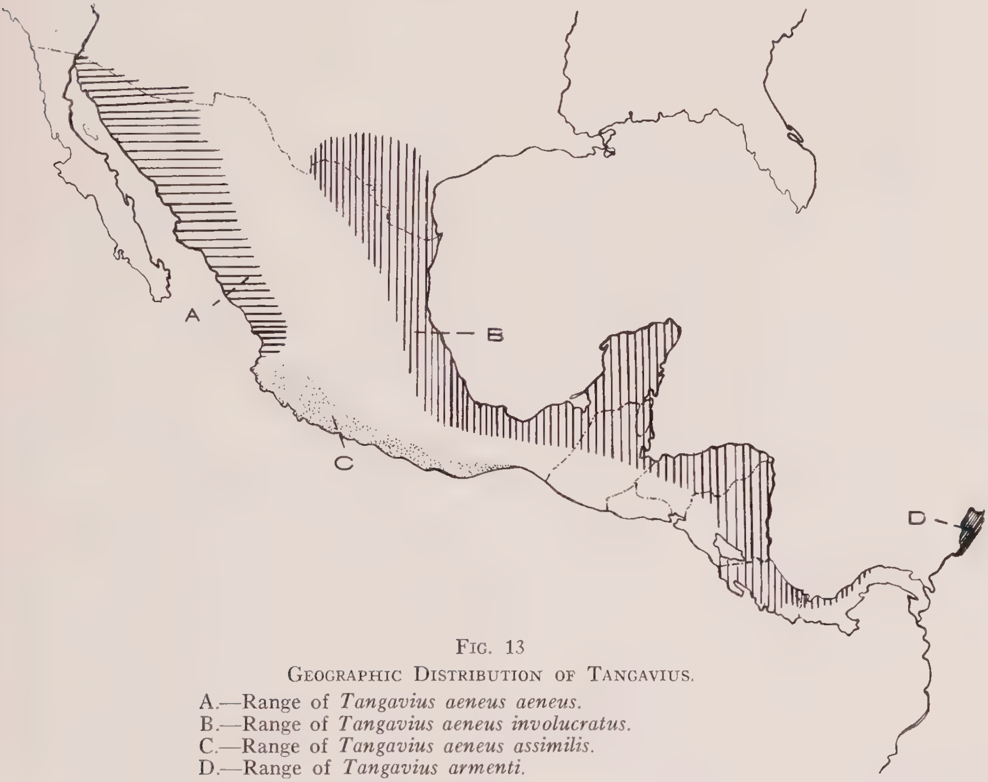

Fig. 13

Geographic Distribution of Tangavius.

A.—Range of *Tangavius aeneus aeneus.*
B.—Range of *Tangavius aeneus involucratus.*
C.—Range of *Tangavius aeneus assimilis.*
D.—Range of *Tangavius armenti.*

This is the best known of the three forms of the species. It is a bird of eastern Mexico and Central America breeding north into eastern Texas as far as San Antonio, but has not been known to breed north of there. From Texas its range extends through eastern Mexico (states of Tamaulipas, Vera Cruz, Puebla, northern Oaxaca, and Yucatan), Guatemala (Choctum, Secanquin, Duenas, San Geronimo), Nicaragua, Costa Rica (Orosi, San Jose, La Palma, Cartago, Naranjo de Cartago, Alajuela), to Veragua, Panama (Calobre, Chitra).

In the vicinity of San Antonio, Texas, it is not uncommon but seems to be migratory, being absent in the winter months. In the lower Rio Grande valley I found the Red-eyed Cowbird to be fairly common as did also Merrill and Sennett. The same is true of Tamaulipas, Mexico, where I saw many birds around Matamoras and Santa Cruz. Little has been recorded from Vera Cruz but I have seen specimens from Jico and Mirador in the collection of the Biological Survey. Sumichrast states that in Vera Cruz it is a very common bird in the hot and temperate lands up to an elevation of 4,600 feet. (Mem. Bos. Soc., Nat. Hist., i, p. 552.) The only data I have from Puebla, Chiapas and Campeche are specimens in the Biological Survey collections as follows: Campeche, Campeche; Chiapas; Comitan, Puebla, Atlixco, and Tehuacan. Boucard found the Red-eye abundant in all parts of Yucutan where it was also noted by Chapman and others.

In Guatemala it is very common from the sea level to a height of 5,000 feet. Owen collected several eggs of this Cowbird on the plain of Salama near San Geronimo. Carriker states that it is, ". . . . fairly common in many parts of Costa Rica, being found over the entire highlands, wherever the land has been cleared and is under cultivation, or in pasture, as well as on the Carribean slope down to 1,200 or 1,500 feet, and the whole of the northern Pacific slope and lowlands. It appears to be absent in the south western part of the country, south of the Rio Grande de Tarcoles, but is abundant in Nicoya and Guanacaste."

Practically nothing is known of the local status or distribution of this bird in Nicaragua and Panama, but it has been taken in both countries south as far as Veraguas (Calobre and Chitra).

Type Locality—Mexico

c. Tangavius aeneus assimilis.

This small race of southwestern Mexico is known only from specimens. Nothing has been written about its local distribution. It occurs in southwestern Mexico in the states of Jalisco (Barranca Ibarra); Colima (Manzanillo); Gurerro (Acapulco); and the Pacific slope of Oaxaca (Tapana, province of Tehuantepec). Besides the localities mentioned above, specimens have been collected at the following localities:— Guererro, Papayo, El Rincon, Zumpango, and Dos Gaminos.

Type Locality—Acapulco, Guererro, s.w. Mexico

MIGRATION

This species is only partly migratory. Early in the spring it is seen mixed in with the feeding flocks of migrating Red-wings, Yellow-headed

Blackbirds, and ordinary Cowbirds. Later as these species leave for the north the Red-eyed Cowbirds form flocks by themselves.

Merrill (Bull. N. O. C., 1877, p. 85) writes that in the lower Rio Grande, ". . . . they are common throughout the year, a small proportion going south in winter."

Smith (Condor 1910 pp. 97-98) in the lower Rio Grande writes that, ". . . . about March, such individuals of Red-eyed Cowbird as have remained (all winter) are heavily reinforced by southern immigrants, and a month later it becomes the most abundant Cowbird. . . . ."

My notes on migration in this species show that the birds did not increase in numbers around Brownsville after the sixth of May so that whatever migration does occur probably ends around the last of April. My field work began on May 1 and I have found no published data on this region for March and April that gives any further data on the subject of migration.

COURTSHIP AND MATING

Review of the Literature

Merrill (Bull. N.O.C., 1877, pp. 85-87) writes as follows of this bird: "The males . . . . have a variety of notes, somewhat resembling those of the Common Cowbird . . . . but more harsh. . . . . When the females are feeding or resting in the shade of a bush the males are eagerly paying their addresses by puffing out their feathers . . . . strutting up and down, and nodding and bowing in a very odd manner. Every now and then one of the males rises in the air, and, poising himself two or three feet above the female, flutters for a minute or two, following her if she moves away, and then descends to resume his puffing and bowing. This habit of fluttering in the air was what first attracted my attention to the species."

Chapman (Bull. A. M. N. H., 1896, p. 280) found the Red-eyed Cowbird common in Yucatan and observed that, ". . . . Occasionally one would rush up to another with a series of bouncing hops, but just as a collison seemed inevitable, the bird would stop and point its bill to the zenith in a most ludicrous manner."

Visher (Auk 1909 p. 307) noted two males courting a female near Tucson, Arizona. "They held their heads up very high, as all cowbirds do, but followed each other around very sedately. The males took turns at driving the other a short distance away, and following the female. Yesterday a male, before a female, went through contortions similar to those frequently performed by the domestic gobbler. Resting on his tarsi, with wings and tail spread and ruff raised, he quivered very noticeably. The slight movement of the wings slowly raised him, still trembling, some six feet above the female, where he paused a moment, a droll sight, and then sank slowly down beside his would-be mate, apparently quite exhausted by the violent, unusual exercise. The song is an even more pleasing combination of squeaks than that of the common cowbird. I have heard it only from solitary males in trees."

Gaumer (Science Record II, 1885, pp. 262-263) writes that in Yucatan, "During the months of June and July the male birds may often be seen strutting about upon the ground with the neck so arched that the long silky feathers are erected or puffed up while the tail is spread and trailed upon the ground in such a way as to make the bird look like a ball of black velvet with brilliant violet and bronze reflections. At other times he will spring into the air a few yards above the ground, where, puffing himself up he balances in mid-air uttering at the same time a peculiarly coaxing noise as if carrying on an interesting conversation with his mate. While thus balancing himself he often rises and falls a few feet and finally comes down gradually until he reaches the ground when he continues to strut for some moments."

Friedmann (Auk, 1925 p. 549) writes of this bird in the lower Rio Grande Valley of Texas:—

"On May 6 a pair of Red-eyes was found in a field and the male watched displaying to the female. He ruffed up the feathers of his cape or mantle first and then all the feathers on the upper parts and the underparts, brought his tail stiffly forward and under, arched his wings slightly, (not more than half as far as it was possible to arch them) and instead of bowing over forwards as does the male of the ordinary cowbird, merely bent his head so that his bill was touching the feathers of his breast for its full extent. Then he suddenly bounced up and down four times, each bounce taking him about an inch from the ground. While bouncing up and down he gave a series of three very deep, guttural, yet bubbling sounds, and then a set of two short and one long, squeaky, thin, high notes quite similar to the song of the ordinary cowbird but wheezier, more throaty and shorter. Occasionally he did bow forward a little, but nothing like the extent to which *M. ater* does. In fact in its courtship this species is midway between the *Molothrus* group and the Rice Grackle *(Cassidix oryzivora)* of Central and South America. In its habit of bouncing up and down it resembles two Argentine species *(Molothrus bonariensis* and *Molothrus brevirostris)* more than it does *M. ater.*"

Courtship Habits of the Red-eyed Cowbird

The Red-eyed Cowbird has two types of courtship habit—terrestrial and aerial. I never saw any sign of display from birds in trees or bushes although Visher (see above) heard the song only from solitary males in trees. However my personal experience with this species is more limited than with any of the others.

The terrestrial display is, in my experience, by far the commoner of the two, and the description I gave of it in the paper quoted above includes the best part of my notes on it. However, considerable variation was noted. Sometimes the birds did not bounce at all, and not infrequently they bounced only once or twice, apparently without giving any of the guttural bubbling notes. This species displays more frequently than do the South American Cowbirds but less often than the ordinary North American species. They strut around more than any of the other Cowbirds.

The aerial display is in reality only a modified part of the terrestrial type and consists of a fluttering flight by the male circling around the female. I have seen males on a few occasions suddenly fly up and flutter over the females, just 2 or 3 feet above the ground and then slowly come down and resume their ordinary terrestrial displays. On no occasion when this was observed was I close enough to hear whether or not the males sang as they fluttered, but probably they did. I have never seen males of this species displaying unless a female was nearby, unlike some of the other Cowbirds. Inasmuch as my experience with the Red-eye is limited to the month of May I cannot say definitely what the limits of the courtship season are. Judging from Merrill's account, the season is well on by the middle of April and when I left southern Texas on June 1st the birds were still singing and displaying. Mr. Charles H. Rogers found the birds displaying at Juan Viñas, Costa Rica, during February and March.

Songs and Call-Notes

The song is confined to the male and is quite similar to that of the ordinary Cowbird *(Molothrus ater)* but wheezier, throatier, the individual notes shorter and the preliminary guttural notes deeper. It may be written as follows *ugh gub bub tse pss tseeee.* Frequently the three first notes are omitted and sometimes the last two are run together. I have heard the song given by birds while flying and also while on the ground. Strangely enough I never heard it from a bird in a tree although Visher's experience (see above) was just the reverse.

The call notes of the Red-eyed Cowbird are not yet well known and are worth careful study. In my experience with this species, call notes were rarely heard and the few that were noted were all of one type, a harsh, beady, almost rasping, *chuck.* This note seemed to be a feeding note and was used by both sexes. I never saw or heard anything to indicate that the birds have any other call notes.

SEXUAL AND TERRITORIAL RELATIONS

Review of the Literature.

Merrill, (Bull. N. O. C. 1877 pp. 85-87) writes that around Fort Brown, Texas, about the middle of April the Red-eyed Cowbirds gather in flocks by themselves and wait for their victims to build. "During the day they scatter over the surrounding country in little companies of one or two females and half a dozen males, returning at nightfall to the picket lines."

Sexual and Territorial Relations

My limited field work on the Red-eyed Cowbird was not sufficient to enable me to work out these phases of the life history of this bird as well as I would like. Consequently this account is decidedly sketchy and incomplete.

In this species the males outnumber the females to a somewhat greater degree than in any other Cowbird as far as I know. During my field work in southern Texas I saw remarkably few females compared to the number of males noticed. My data are not detailed enough to say definitely whether or not the birds are promiscuous in their sexual intercourse, but they probably are to the same extent as the common Cowbird of North America, *Molothrus ater*. I did find some indications of pairing, but not enough to justify any positive conclusions.

That the males establish singing trees and territories is certain as I have noted in several instances that certain males were to be found every day in the same tree.

They were first noted in their singing trees on May 6 and after that date were to be found there every day. They certainly were not there (in two cases at least) before May 6, as I had been working nearby for a few days before and would have noticed them. So then it seems that the male Red-eyed Cowbirds establish their territories and singing trees about May 6 in the Brownsville region. Probably some start earlier and others later. I have no data as to how late the birds remain in their breeding territories but I should judge it would be until about the beginning of July, which, in the lower Rio Grande, is a very late date for breeding.

Eggs and Egg-Laying

Review of the Literature

Merrill (1877 pp. 85-87) found that the Red-eyed Cowbird parasitized Orioles far more commonly than any other birds. He collected 22 eggs of this Cowbird in one season. All but 2 were found in nests of Bullock's, Sennett's, and Orchard Orioles. He writes that although Yellow-breasted Chats and Red-winged Blackbirds bred abundantly in places most frequented by these Cowbirds he only once found the latter's egg in a Chat's nest and never in a Red-wing's. On one occasion he found a female Red-eyed Cowbird hanging with a stout thread around its neck from a nest of the Bullock's Oriole. "The nest contained one young of this Cowbird and it is probable that its parent after depositing the egg was entangled in the thread on hurriedly leaving the nest, and there died."

Bendire (1895, pp. 601-602) writes that "the Orioles appear to be the especial victims of the Bronzed Cowbird, and among these, Audubon's seem to be the worst sufferer. In nine sets of this species in the U. S. National Museum collection there are only two which contain the normal number of eggs, 4. The other seven all contain from 1 to 3 of these parasitic eggs, with 1 or 2 of their own, and some of these are usually punctured.

"The eggs of the Bronzed Cowbird are rather glossy; the shell is finely granulated and strong. Their shape varies from ovate to short and rounded ovate. They are pale bluish green in color and unspotted. . . . . .

"The average measurement of 38 specimens in the U. S. National Museum collection is 23.11 by 18.29 mm., or 0.91 by 0.72 inch. The largest egg of the series measures 24.64 by 18.80 mm., or 0.97 by 0.74 inch.; the smallest, 21.84 by 16.76 mm., or 0.86 by 0.66 inch."

Hanna (Condor, 1924, p. 149) records the weight of a Red-eye's egg as 4.06 grams.

Eggs and Egg-Laying

The eggs of the Red-eyed Cowbird are very light bluish green, bluish, or greenish, and without any markings whatsoever. The color varies in shade from nearly white to pale bluish or greenish. They seem slightly slenderer in outline than most *Molothrus* eggs. The commonest type is rounded ovate but many eggs are relatively less rounded. The eggs of this species are much more glossy than those of the other Cowbirds, the gloss being largely due to the fact that the shells are much more finely granulated than are those of the *Molothrus* group. In size the eggs of the Red-eye vary from 25 x 19 mm. to 21 x 16.5 mm., the average being about 23 x 18 mm. All the eggs of one female are similar in color, size, and shape.

The number of eggs layed in one season by one female is still unknown, but it probably is about the same as in the other Cowbirds. The eggs are layed at intervals of one day and usually none of the rightful eggs are removed by the Cowbird when laying into a nest. This I have proved by personal observation. I found a nest of a Sennett's Hooded Oriole with two eggs of the owners one day and the next afternoon I revisited it and found it contained three eggs of the owners and one of the Red-eyed Cowbird. In this case the parasite certainly did not remove an egg when laying. In another nest which contained three eggs when first found, two identical Red-eyed Cowbird's eggs were laid one day apart.

In a few cases writers have reported that some of the eggs found in nests containing eggs of the Red-eyed Cowbird were pecked or smashed. If this is due to the parasite, then it is a more or less irregular habit as most nests show no signs of it.

The largest number of Red-eye's eggs ever found in one nest is four. This was in a nest of an Orchard Oriole. In the majority of cases only one egg is laid in a nest. Occasionally two different females lay into the same nest but such cases are rather scarce. Merrill records such an instance in a nest of a Sennett's Oriole at Brownsville, Texas.

The incubation period of the Red-eyed Cowbird is from twelve to thirteen days. In this it shows its relationship to the Screaming Cowbird *(Molothrus rufo-axillaris)* of South America. It also agrees with this bird in that its breeding season is rather late. In southern Texas the Red-eye does not usually begin to breed until the middle of May while the Dwarf Cowbird *(Molothrus ater obscurus)* begins laying a month earlier. In Pina County, Arizona, Willard[1] found the earliest eggs of the typical race of the Red-eye on May 31. However, on very rare occasions, eggs have been taken in southern Texas in the last week of April, but such cases are exceptional.

THE VICTIMS

The Red-eyed Cowbird victimizes relatively few species of birds. The various species of Orioles seem to be the chief hosts of this parasite. When we consider that of all the species in the genus *Molothrus,* the Screaming Cowbird, *M. rufo-axillaris,* is the nearest relative of the Red-eye this restriction of the parasitism of the latter to relatively few species becomes particularly interesting. The Screaming Cowbird is parasitic almost solely on the Bay-winged Cowbird, its closest relative, while the Red-eye, not having any non-parasitic Cowbirds to victimize has taken to using the nests of an allied genus, *Icterus* to a very large extent. It is also gradually widening its sphere of activity to include more and more genera and species and at present is definitely known to victimize eleven genera and seventeen species and subspecies, but about 75 per cent of all the eggs are laid in nests of Orioles. I have data on 76 victimized nests all in all and of these no less than 51 belong to four species of *Icterus.*

Before passing to the annotated list of victims it may be well to list them separately for each race of the Red-eyed Cowbird.

a. Tangavius aeneus aeneus

Pitangus derbianus	Derby Flycatcher
Icterus melanocephalus auduboni	Audubon's Oriole
Icterus cucullatus nelsoni	Arizona Hooded Oriole
Icterus sclateri	Sclater's Oriole
Pipilo fuscus mesoleucus	Canyon Towhee
Atlapetes gutturalis parvirostris	Yellow-throated Sparrow
Mimus gilvus guatemalensis	Guatemala Mockingbird

b. Tangavius aeneus involucratus

Muscivora forficata	Scissor-tailed Flycatcher
Icterus melanocephalus auduboni	Audubon's Oriole
Icterus cucullatus sennetti	Sennett's Oriole
Icterus spurius	Orchard Oriole
Icterus bullockii	Bullock's Oriole
Richmondena cardinalis canicaudus	Gray-tailed Cardinal

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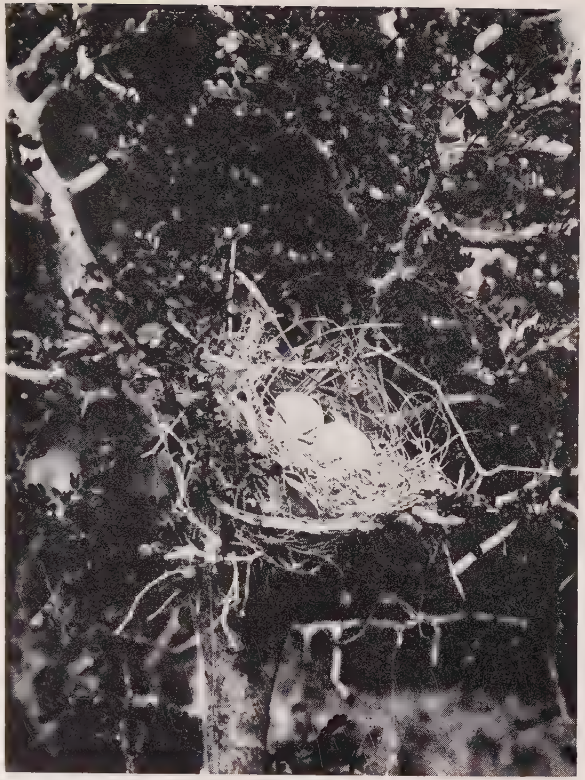
[1] Manuscript notes in the files of the Biological Survey.



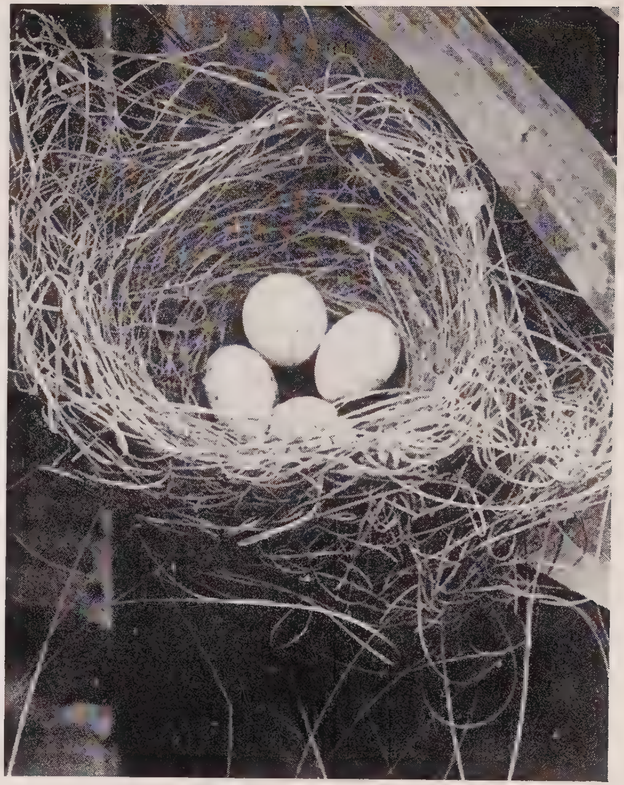


PLATE XXVI.

Nest of Audubon's Oriole with One Egg of Tangavius aeneus involucratus and One of Molothrus ater obscurus.

Nest of Sennett's Hooded Oriole with Three Eggs of the Owner and One of Tangavius aeneus involocratus.

Guiraca caerulea lazula	Western Blue Grosbeak
Icteria virens longicauda	Long-tailed Chat
Mimus polyglottos leucopterus	Western Mockingbird
Toxostoma longirostre sennetti	Sennett's Thrasher
Thryomanes bewickii cryptus	Texas Wren

Annotated List

Muscivora fortificata (Gmel.) Scissor-tailed Flycatcher.

It is impossible to say to what extent this flycatcher is imposed upon by the Red-eyed Cowbird. More data is needed, but probably the Scissor-tail will eventually prove to be a rather uncommon victim. Merrill recorded it as a victim of the Red-eye upon the testimony of a soldier at Fort Brown who brought him an egg of the Cowbird and said he found it in a Scissor-tail's nest. As far as I have been able to find out no one else has ever found the Scissor-Tail to be parasitized. There is no reason why it should be more or less exempt, for its close relative, the Fork-tailed Flycatcher, is commonly imposed upon in Argentina by the Shiny Cowbird.

In this case the record refers to the eastern race of the Red-eye,—*T. a. involucratus.*

Pitangus derbianus (Kaup). Derby Flycatcher.

Salvin and Godman, in their great work, the Biologia Centrali Americani (p. 452) record eggs of the Red-eyed Cowbird from nests of several species among which is the Derby Flycatcher. No further data are given. Owen (Ibis, 1861, pp. 61-62) writes that at San Geronimo Guatemala, the eggs of the Red-eyed Cowbird are occasionally found in nests of *Pitangus derbianus.* Probably it is seldom parasitized as it is a large, pugnacious bird eminently able to keep off any unwelcome visitors.

The Cowbird is of the typical race—*T. a. aeneus.*

Icterus melanocephalus auduboni Giraud. Audubon's Oriole.

Bendire (1895 p. 601) writes that the Orioles appear to "be especial victims of the Bronzed Cowbird, and among these Audubon's seems to be the worst sufferer. In the nine sets of this species in the U. S. National Museum collection there are only two which contain the normal number of eggs, 4. The other seven all contain from 1 to 3 of these parasitic eggs, with 1 or 2 of their own, and some of these are usually punctured." Near Brownsville, Texas, I found two nests of the Audubon's Oriole; both of them containing eggs of the Red-eyed Cowbird. One had two eggs of the Oriole and one of the Red-eye. The other contained one Red-eyed Cowbird's egg and one of the Dwarf Cowbird and one of the owner.

Both northern races of the Red-eyed Cowbird are parasitic on the Audubon's Oriole.

Icterus cucullatus

Two races of this Oriole are known to be victimized.

a. *Icterus cucullatus sennetti* (Ridgw.). Sennett's Oriole.

A common victim of the eastern race of the Red-eyed Cowbird, *Tangavius aeneus involucratus.* Merrill (Bull. N. O. C. 1877, pp. 85-87) writes that he once found a nest of the Sennett's Oriole early in June containing four eggs of the Oriole and one of the Red-eyed Cowbird, all of which he removed. A few days later he revisited the nest and found two more Red-eyed Cowbird's eggs, so unlike each other that they were probably laid by different birds. Still another egg was laid in the same nest within ten days.

Near Brownsville, Texas, in May 1924 I found sixteen nests of this Oriole, three of which contained eggs of the Red-eyed Cowbird. (Auk. 1925 p. 550). I have known this bird to rear the young Red-eyes; in fact I found two young Red-eyes in one nest of Sennett's Oriole.

b. *Icterus cucullatus nelsoni* Ridgw. Arizona Hooded Oriole.

Visher (Auk 1910, p. 210) records this race as a victim of the western race of the Red-eyed Cowbird, the so-called Bronzed Cowbird, *Tangavius aeneus aeneus,* at Tucson, Arizona. Two young Bronzed Cowbirds were raised by Arizona Hooded Orioles at that place.

Icterus spurius (Linn.). Orchard Oriole.

A commonly victimized species according to Merrill, who also records a very remarkable nest, found on, ". . . . June 20, containing 3 eggs of the Red-eyed Cowbird, while just beneath it was a whole egg of the parasite; also a broken one of this and of the Dwarf Cowbird, *M. obscurus.* Two of the eggs in the nest were rotten. The third, strange to say, contained a living embryo. As the nest was certainly deserted, I can only account for this by supposing that the 2 rotten ones were laid about the first week of June, when there was considerable rain, and that the other was deposited soon after, since which time the weather had been clear and very hot."

Mr. R. W. Quillin informs me that this species is victimized by the Red-eye around San Antonio and in Kleberg County, Texas. He found a nest containing 2 eggs of the Oriole, 4 of the Dwarf Cowbird, and one of the Red-eyed Cowbird.

Icterus bullocki (Swains.). Bullock's Oriole.

This species is frequently parasitized by the Red-eyed Cowbird. It may occasionally rid itself of the parasitic egg as Merrill, (1877 pp. 85-87) writes that twice he found broken eggs of the Red-eye under nests of Bullock's Oriole on which the owner was sitting. He also found a female Red-eyed Cowbird hanging with a stout thread about its neck to a nest of Bullock's Oriole on one occasion. The nest contained a young Red-eyed Cowbird and, ". . . . it is probable that its parent after depositing the egg was entangled in the thread on hurriedly leaving the nest, and there died. It had apparently been dead about two weeks."

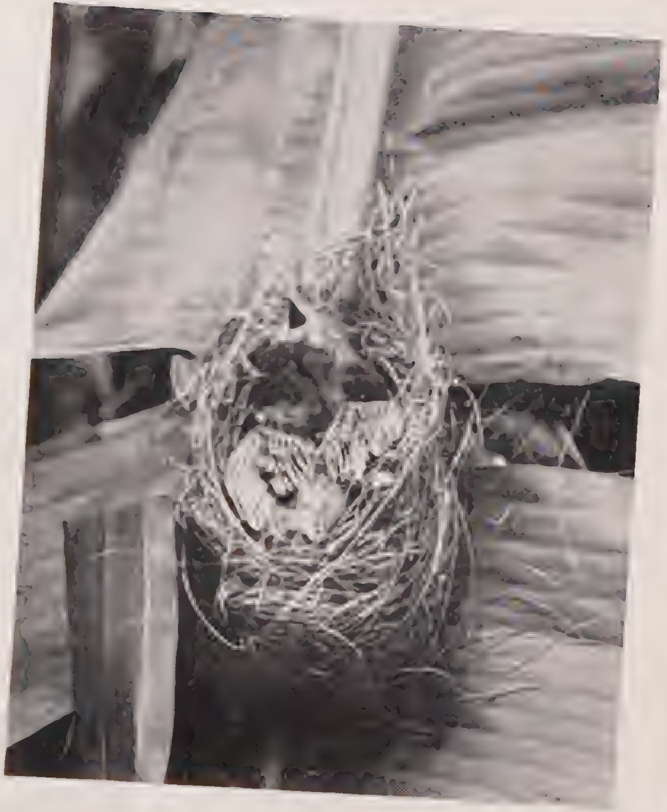
Attwater (Auk. 1892 p. 237) found a nest of this bird near San Antonio with 5 eggs of the owner and 1 of the Red-eye.

All the records for this bird refer to the eastern form of the Red-eyed Cowbird—*Tangavius aeneus involucratus.*

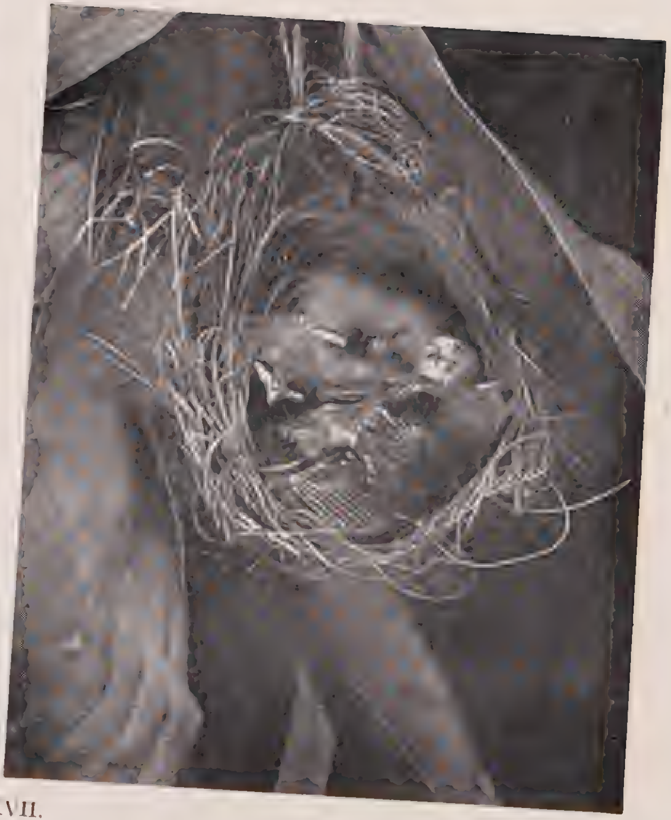
Icterus sclateri Cassin. Sclater's Oriole.

At San Geronimo, Guatemala, Owen (Ibis, 1861, pp. 61-63) found this Oriole to be not uncommonly victimized by the Bronzed Cowbird, (western race *T. a. aeneus.*)

PLATE XXVII.



Nest of Sennett's Hooded Oriole with Two Young Tangavius aeneus involucratus and One Young and One Egg of the Owner.



Nest of Sennett's Hooded Oriole with Two Young Tangavius aeneus involucratus.

Richmondena cardinalis canicaudus (Chapm.). Gray-tailed Cardinal.

The first recorded Red-eyed Cowbird's egg found in the United States was taken from a Gray-tailed Cardinal's nest on May 14, 1876 by Merrill near Fort Brown (now Brownsville) Texas. Mr. R. D. Camp has found Red-eyed Cowbirds' eggs in nests of this species in the same region within the last dozen years, but I have seen no published records other than the first one. *T. a. involucratus* is the local Red-eye of the Brownsville region.

Guiraca caerulea lazula (Less.). Western Blue Grosbeak.

Sennett (Bull. U. S. Geol. and Geog. Surv. Terr. V 1879, p. 396) lists the present species as a victim of the Red-eyed Cowbird. It is also listed by Bendire, probably on the basis of Sennett's record. The Cowbird in question is the eastern race. *T. a. involucratus.*

Atlapetes gutturalis parvirostris Dwight and Griscom. Yellow-throated Sparrow.

In Costa Rica this finch is a common victim of the Red-eyed Cowbird which is represented in that region by its western race, the Bronzed Cowbird (subsp. *aeneus*). Cherrie (Auk 1892 p. 25) gives data on several parasitized nests.

Pipilo fuscus mesoleucus (Baird). Canyon Towhee.

This species was recorded by Visher (Auk 1910, p. 210) as a victim of the Bronzed Cowbird near Tucson, Arizona. Two young Cowbirds were raised by this species. Nothing more is known of this species in relation to the Cowbird.

Icteria virens longicauda Lawr. Long-tailed Chat.

Merrill (Bull. N. O. C. 1877 pp. 85-87) writes that he once found a Red-eyed Cowbird's egg in a nest of a Chat near Brownsville, Texas. He considers this species a very uncommon victim because only one out of a great many of its nests examined contained an egg of the Red-eyed Cowbird. I have not heard of any more recent record. The Cowbird is of the eastern race, *T. a. involucratus.*

Mimus polyglottos leucopterus (Vigors). Western Mockingbird.

A rarely victimized species. While in the lower Rio Grande I was told of a nest of this bird with a very light bluish white, unspotted egg in it as well as three of the ordinary Mockingbird's eggs. On showing my informant several assorted eggs he picked out a Red-eyed Cowbird's egg and said that it was like the one he saw in the Mockingbird's nest. I found him to be very reliable, and see no reason for not accepting the record. It is the first record for this bird. (Auk 1925 p. 549). The Cowbird is the eastern form, *involucratus.*

Mimus gilvus guatemalensis Ridgway. Guatemala Mockingbird.

Owen (Ibis 1861, pp. 60-62) at San Geronimo, Guatemala, found that the Red-eyed Cowbird frequently lays in nests of this Mockingbird. In one instance he found as many as five of the parasitic eggs in one nest together with two of the owner. The local form of the Cowbird is *T. a. aeneus.*

Salvin and Godman (Biol. Cent. Am., Aves., I., p. 452) record the Guatemala Mockingbird as a victim of the Red-eyed Cowbird at San Geronimo, Guatemala, probably on the basis of Owen's record.

Toxostoma longirostre sennetti (Ridgw.) Sennett's Thrasher.

A rare victim. Mr. R. D. Camp found a nest of this bird on May 18, 1924 at Jagou's ranch, Cameron County, Texas, with two eggs of the owner and one of the Red-eyed Cowbird. He informs me that in past years he had once taken a Red-eye's egg from a nest of a Sennett's Thrasher. These records all refer to *Tangavius aeneus involucratus.*

Thryomanes bewicki cryptus Oberh. Texas Wren

On May 6, 1924, near Brownsville, Texas, Dr. A. H. Cordier found a nest of the Texas Wren containing three eggs of the Red-Eyed Cowbird and one of the Wren's. The female Wren was sitting on the eggs. The next day all three eggs hatched and two days later the nest and young were destroyed by a skunk (Auk, 1925, p. 554). The parasite in this case is the eastern form—*Tangavius aeneus involucratus.*

THE YOUNG

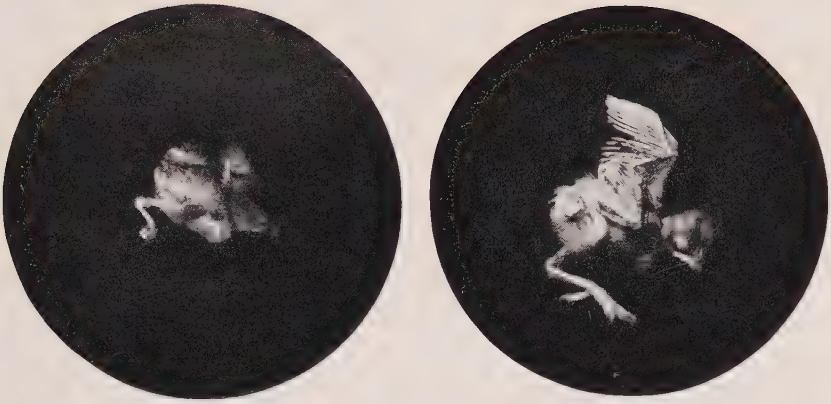
Nothing has been written about the young of the Red-eyed Cowbird. My own notes are incomplete as my field work on this species was limited to one month.

The Young in the Nest

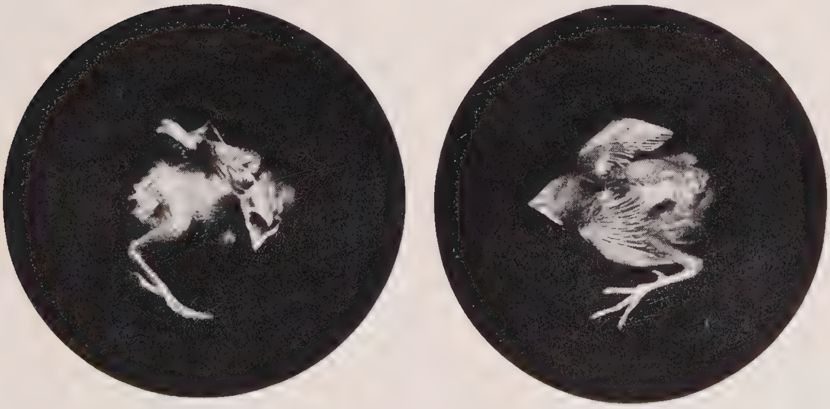
Physical Development. I have not seen a newly hatched Red-eyed Cowbird but have found birds one day old. They resemble young *Molothrus ater* of corresponding age but are a little larger in size. The skin is orange-pink; the eye-skin greenish blue; the bill and feet dusky yellowish, the claws light yellow; the gape of the bill swollen and white; the inside of the mouth reddish; the down mouse gray and present on the head, spinal, humeral, alar, and femoral tracts, longest on the head and shortest on the spinal tract; egg-tooth prominent and pyramidal in shape and about 1 mm. high.

On the second day the birds nearly double in weight; the skin becomes slightly tinged with brownish; no new neossoptiles appear and the old ones apparently do not increase in length.

I have no data on three day old birds as the ones on which the above notes were made perished in a heavy rain storm. A four day old bird had the primaries and secondaries sprouted; the eyes were still closed; feather sheaths were present on all the tracts except the head where the greenish gray skin (formerly orange), was still covered with light mouse gray down. This bird when five days old measured 82 mm. in length, a considerable advance over the previous day when it measured only 78 mm. The eyes opened on the fifth day and the sheaths of the rectrices began to push through the skin while those of the remiges began to open. The sixth and seventh days saw little change except growth and unfurling of the feathers from their sheaths.



1. Two days old. 2. Five days old.



3. Five days old. 4. Six days old.

PLATE XXVIII.

Young Tangavius aeneus involucratus.

When about eleven days old the young leave the nest.

Behavior and Development of Instincts. The one day old Red-eye exhibits powers of orientation sufficient to right itself if turned on its back. It also has a typical "Cowbird" food reaction, raising the head and opening wide the mouth and begging for food with quivering body and soon falling down again exhausted by its strenuous efforts. The initial call note is a faint, somewhat beady *peep* which in the course of the next few days assumes a strident quality which soon comes to dominate it. The general posture of the bird is a lying one, the pot-belly being the chief support of the body.

The period of sense perception begins with the opening of the eyes of the fifth day. The young bird now assumes a sitting position and shows considerable interest in the nest and its immediate surroundings. It pecks at straws and feathers, and seems rather restless in general. The food reaction is augmented by a rapid quivering of the wings in addition to the general bodily trembling. I once watched a pair of Sennett's Orioles feed a young Red-eyed Cowbird just after it had left the nest. They fed it at intervals of from 30 seconds to several minutes, both the male and female foster-parents bringing food. The food consisted of lepidopteran larvæ, and coleopteran grubs. In one nest of this Oriole I found two young Orioles and a four day old Red-eyed Cowbird which was about as big as the two young Orioles together. The young Cowbird was very quiet while at the least disturbance of the nest the young Orioles gave the food reaction. It looked as though the two latter were very hungry while the young parasite seemed well fed. The old Orioles fed the young Cowbird twice while I watched the nest and fed their own young only once during this time. The next day the parasite was alone in the nest; the two young Orioles were gone. The call note of the young Red-eyed Cowbird is similar to that of the young *Molothrus ater* but harsher and more nasal while still retaining the beady quality.

The young Red-eye seems to get along with the rightful young in the nest better than do the young of *M. bonariensis* or *M. ater* and it sometimes happens that some of the rightful young survive together with the parasite although in most cases the legitimate young last but a few days in face of the competition of the Red-eye. However, they do seem to survive longer with the young Red-eye than do young Sparrows or Warblers with young of *M. ater.* This may be partly due to the fact that the victims of the Red-eye are more nearly its own size than are those of the other Cowbirds. It is of interest however, when we remember that the young of *M. rufoaxillaris,* which of all the species of *Molothrus* is most closely related to *Tangavius,* do not starve out the rightful young but grow up together with them.

The Young Out of the Nest

When about eleven days old the young Red-eyed Cowbird usually leaves the nest and as a rule stays nearby for several days. For about two weeks and possibly more it is cared for by its foster-parents and then shifts for itself. Usually by the time this happens the season is well advanced as the Red-eye is a fairly late breeder, and the young repair to the fields and marshes for the post-juvenal molt. In these places all the young congregate from all the surrounding country-side and when the molt is finished the birds come out in flocks.

PLUMAGES AND MOLTS

The sequence of plumages and molts differs from that in *Molothrus* in that the young male does not acquire the adult plumage until after the first postnuptial molt (second autumn) and in that there is a partial spring molt. This latter feature seems also confined to the male.

Tangavius aeneus aeneus

Male

1. Natal Down: dusky mouse-gray.

2. Juvenal Plumage acquired by a complete postnatal molt.

Above deep sooty grayish, the wing coverts with terminal margins of paler gray; underparts similar but paler, indistinctly streaked with dull olive-yellowish, the abdomen inclining to the latter color. The young male of this race is very similar to the young female of *involucratus,* but is decidedly paler, especially below.

3. First Winter Plumage acquired by a complete postjuvenal molt. Young males now become similar to adult females but darker, except in cases where some of the juvenal feathers are retained.

Above dark blackish gray, the feathers with darker centers, especially on the back and scapulars where slightly glossed with greenish blue; wings and tail dusky grayish, faintly glossed with greenish, the feathers with narrow paler, grayish margins; underparts dark gray, sometimes streaked very slightly with darker gray, the chin and throat paler; bill, legs, and feet black.

4. First Nuptial Plumage acquired by wear which shows rather little, and partly by molt (chiefly confined to the neck but also affecting the head and breast).

Similar to the first winter plumage but the head, neck, and breast dull greenish bronze.

5. Adult Winter Plumage acquired by a complete postnuptial molt.

Head, neck, and body greenish bronze, the rump and upper tail coverts violet; the plumage soft and smoothly silky and very glossy; wings glossy dark greenish blue, brightest on the greater coverts and tertials, more greenish and less bright on the primaries, primary coverts, and alula; lesser and middle coverts dark bluish violet; tail dark metallic greenish blue; iris red; legs, feet, and bill black or dark blackish brown.

6. Adult Nuptial Plumage acquired by wear and by an irregular but always small amount of molt on the anterior parts of the body. Plumage similar to adult winter plumage but very slightly brighter.

Measurements (skins): wing 117-122 mm. (119 mm.); tail 81.8-88 mm. (85 mm.); culmen, from base, 22.5-23.6 mm. (23 mm.).

Females

1. Natal Down: dusky mouse-gray.

2. Juvenal Plumage: not seen; probably acquired by a complete postnatal molt.

3. First Winter Plumage: acquired by a complete postjuvenal molt.

Young birds are now indistinguishable from adults. Above dark mouse gray, the feathers with darker centers, especially on the back and scapulars, where slightly glossed with greenish blue; wings and tail grayish dusky, faintly glossed with greenish, the feathers with narrow paler, grayish margins, most distinct on the smaller wing coverts; underparts pale mouse-gray, sometimes indistinctly streaked with darker, the chin and throat paler, bill, legs, and feet black.

4. First Nuptial Plumage acquired by wear which is hardly noticeable. Plumage similar to preceeding.

5. Adult Winter Plumage acquired by a complete postnuptial molt. Adults cannot be told from young birds in first winter plumage.

6. Adult Nuptial Plumage acquired by wear as in young birds. Plumage similar to young birds.

Measurements (skins): wing 101-107.5 mm. (104.5 mm.); tail 70-76.5 mm. (73.5 mm.); culmen, from base, 19.3-20.5 mm. (19.8 mm.).

Tangavius aeneus involucratus

Male

1. Natal Down: same as in *T. a. aeneus;* dusky mouse-gray.

2. Juvenal Plumage acquired by a complete postnatal molt.

Dull sooty black or dark sooty, the feathers of the underparts of the body with more or less distinct narrow margins of paler; mandible brownish basally.

3. First Winter Plumage acquired by a complete postjuvenal molt.

Dull black, the underparts, especially the throat sometimes dark sooty brownish; back and scapulars very faintly, the wings, upper tail coverts and tail strongly, glossed with bluish green; bill, legs, and feet black. Young males in this plumage are similar to adult females.

4. First Nuptial Plumage acquired by wear which shows very little, and to a slight extent by molt involving the head and neck and breast. Plumage similar to the first winter plumage but the head, neck, and breast dull bronzy.

5. Adult Winter plumage acquired by a complete postnuptial molt.

Head, neck, and body greenish bronze, rump like the back, the plumage soft and silky but not as smooth as in *T. a. aeneus;* "presenting the appearance of having been wet and imperfectly dried" (Ridgway); tail coverts blue-black, the upper ones glossed with violet; wing coverts glossy dark greenish blue, brightest on greater coverts and tertials, less bright as well as more greenish on primaries, primary coverts and alula; lesser wing coverts dark metallic violet, the middle coverts violet-bluish; tail dark metallic bluish-green or greenish-blue; bill black; iris red; legs and feet black or blackish brown.

6. Adult Nuptial Plumage acquired by wear. Similar to preceding plumage but very slightly brighter.

Measurements (skins): wing 111.8-120.1 mm. (116.5 mm.); tail 75.7-82.3 mm. (79.6 mm.); culmen, from base, 22.2-24.0 mm. (23.0 mm)

Female

1. Natal Down: same as in male.
2. Juvenal Plumage acquired by a complete postnatal molt.

Similar to corresponding plumage in the male but paler and grayer, above sepia or grayish sepia; beneath paler and grayer, with indistinct narrow paler margins to the feathers.

3. First Winter Plumage acquired by a complete postjuvenal molt.

Dull black, the underparts, especially the throat sometimes dark sooty brown; back and scapulars very faintly, the wings, upper tail coverts and tail strongly, glossed with bluish-green; neck ruffs much less developed than in the male. The female of this race is much darker than that of *T. a. aeneus.*

4. First Nuptial Plumage acquired by wear which shows rather little. Plumage similar to the preceeding.

5. Adult Winter Plumage acquired by a complete postnuptial molt. Adults cannot be told from young in first winter plumage.

6. Adult Nuptial Plumage acquired by wear as in young birds. Similar to the preceeding.

Measurements (skins): wing 97.5-107 mm. (103 mm.); tail 64-74.7 mm. (73 mm.); culmen, from base, 19.8-21.3. mm. (20.6 mm.).

Tangavius aeneus assimilis

Male

1. Natal Down: unknown.
2. Juvenal Plumage: not seen.
3. First Winter Plumage: not seen.

Adult Plumage: I have seen but few fully adult males of this subspecies. Ridgway describes it as similar to *T. a. aeneus* but smaller. However one specimen I examined had the rump more or less bronzy in color like the rest of the back (rump violet in *aeneus*), but the others agreed with Ridgway's description. This race is similar to *aeneus* but smaller.

Measurements (skins) (taken from Ridgway): wing 105.2-111.8 mm. (108.7 mm.); tail 74.4-81.5 mm. (77.5 mm.); culmen, from base, 20.8-22.6 mm. (21.3 mm.).

Female

No females of any age seen. This is all the more unfortunate as the female plumage would probably be a better clue to the affinities of this race than the plumage of the male.

FOOD

As far as my observations go, the Red-eyed Cowbird is entirely gramnivorous in its food habits but I feel that more extensive data would show it to feed upon insects as well. The gizzards of some twenty-odd specimens collected during May, 1924, near Brownsville, Texas contained only weed seeds and a few oats. The oats were undoubtedly picked up in the cavalry stable yards at Fort Brown. As many as 1,500 small grass seeds were found in a single stomach and most of the birds examined had consumed large numbers of these seeds. From this it may be judged that the species is highly beneficial in its food habits although its activities at times in fields of ripening grain or rice might be less creditable, but of this we know nothing as yet.

The Red-eye associates considerably with cattle and in all probability does so for the insects it finds scared up by the grazing animals, but my stomach content examinations have failed to reveal even a trace of insect food.

ENEMIES

The Red-eyed Cowbird probably suffers to some extent from hawks and carnivorous mammals but no definite instances of this sort have been reported.

No parasitic insects or intestinal worms have been taken from this species.

COMMON NAMES

The Red-eyed Cowbird has several common names among the Spanish and English speaking peoples in the countries it inhabits.

a. English names
   1. Red-eyed Cowbird *(T. a. involucratus)*
   2. Red-eye
   3. Glossy Cowbird
   4. Bronzed Cowbird *(T. a. aeneus)*

b. Spanish names
   1. Tordo
   2. Tordito
   3. Bandito de cola
   4. Analgo
   5. Tordo gallito

SYNONYMY

Tangavius aeneus aeneus

Psarocolius aeneus, Wagler, Isis, 1829, p. 758 ("Mexico;" ex *Icterus aeneus* Lichtstein, manuscript; coll. Berlin Mus.); Bonaparte, Consp. Av., i, 1850, p. 426.

(Agelaius) aeneus, Gray, Gen. Birds, ii, 1849, p. 346.

(Molothrus) aeneus, Cabanis, Mus. Hein., i, Sept., 1851, p. 192, footnote (Mexico); Ridgway, Man. N. Am. Birds, 1887, p. 367, part.

Molothrus aeneus, Cassin, Proc. Ac. Nat. Sc. Phil., 1866, p. 18, part (Mazatlan); Lawrence, Mem. Bost. Soc. N. H., ii, 1874, p. 281, part (Mazatlan; habits); Sclater, Cat. Birds Brit. Mus., xi, 1886, p. 334, part, (Presidio, near Mazatlan; Mazatlan); Salvin and Godman, Biol. Centr. Am. Aves, i, 1886, p. 451, part (Mazatlan; Presidio).

(Molothrus) aeneus, Sclater and Salvin, Nov. Av. Neotr., 1873, p. 37, part.

(Callothrus) aeneus, Ridgway, Man. N. Am. Birds, 1887, p. 589, part; 2d ed. 1896, p. 600, part.

Callothrus aeneus aeneus, Ridgway, Bull. U. S. Nat. Mus. 50, 1902, part ii, p. 203-204 (syn., descr., range).

Tangavius aeneus aeneus, A.O.U. Check List, 1910, p. 232; Friedmann, Auk, 1927, p. 507.

Tangavius aeneus involucratus

Molothrus aeneus (not *Psarocolius aeneus* Wagler), Sclater, Proc. Zool. Soc. Lond., 1856, p. 300 (Cordova, Vera Cruz); 1859, p. 365 (Jalapa, Vera Cruz); (?) p. 381 (Oaxaca); Cat. Amer. Birds, 1862, p. 135 (Jalapa); Birds Brit. Mus., xi, 1886 p. 334, part (Orizaba and Jalapa, Vera Cruz, Oaxaca?; n. Yucatan; Choctum and Duenas, Guatemala; Orosi, Costa Rica; Calobre and Chitra, Veragua, Panama); Salvin & Sclater, Ibis 1860, p. 34 (Duenas, Guatemala); Owen, Ibis 1861, p. 61 (San Geronimo, Guatemala; descr; eggs); Cabanis, Journ. f. Orn. 1861, p. 81 (San Jose, Costa Rica); Cassin, Proc. Ac. Nat. Sc. Phil. 1866, p. 18, part (Jalapa; Yucatan; Nicaragua; Costa Rica; Panama); Lawrence, Ann. Lyc. N.Y., ix, 1868, p. 104, (San Jose, Costa Rica); Sumichrast. Mem. Bost. Soc. Nat. Hist. i, 1869, p. 552 (hot and temp. regions, Vera Cruz); Salvin, Proc. Zool. Soc. Lond., 1870, p. 191; (Calobre and Chitra, Veragua); Cat. Strickland Coll., 1882 p. 265 (Guatemala); Merrill, Bull. N.O. Cl. i, 1876, p. 88 (Fort Brown, Texas); ii, 1877, p. 85 (do. habits); Proc. U.S. Nat. Mus. i, 1878, p. 130 (do); Boucard, Liste Ois. Guat. 1878, p. 36; Proc. Zool. Soc. Lond. 1878, p. 59 (San Jose, Costa Rica); 1883, p. 445 (n. Yucatan); Brewer, Ibis, 1878, p. 116 (Fort Brown, Texas; descr. eggs); Ridgway, Proc. U. S. Nat. Mus. i, 1878, p. 130, part (syn, diagn.); ix 1886, p. 151 (crit.; Chietla, etc., Puebla; Jalapa); Nom. N. Am. Birds, 1881, no. 259; Coues & Sennett, Bull. U.S. Geol. and Geog. Surv. Terr., iv, 1878, p. 23 (Brownsville and Hidalgo, Texas; habits, synonomy, diag. etc.); Sennett, Bull. U.S. Geol & Geog. Surv. Terr v, 1879, p. 396 (Lometa, Texas; habits, measurements, etc.); Allen, Bull, N.O. Cl., v, 1880, p. 90; Coues, Check List, 2d ed. 1882, no. 315; Nutting, Proc. U.S. Nat. Mus., v, 1882, p. 392 (La Palma, w. Costa Rica); Zeledon, Cat. Aves de Costa Rica, 1882, p. 10; Ferrari-Perez, Proc. U. S. Nat. Mus., ix, 1886, p. 151 (Izucar de Matamoras, Chietla, and Acatlan, Puebla; Jalapa, Vera Cruz), Am. Orn. Union Check List, 1886, no. 496; Salvin & Godman, Biol. Centr. Am., Aves, i, 1886, p. 451, part (all localities except Maxatlan, Presidio, Manzanillo Bay, and mountains of Colima).

(Molothrus) aeneus, Sclater and Salvin, Nom. Av. Neotr., 1873, p. 37 part.

(Molothrus) aeneus, Coues, Key N. Am. Birds, 2d ed. 1884, p. 403; Ridgway, Man. N. Am. Birds, 1887, p. 367, part.

Agelaius aeneus, Cassin, Proc. Ac. Nat. Sc. Phil., 1848, p. 90 (Puent Nacional, Vera Cruz).

Icterus bonariensis (not *Tanagra bonariensis,* Gmelin), Bonaparte, Proc. Zool. Soc. Lond., 1837, p. 116 (Guatemala).

(Molothrus) robustus, Cabanis, Mus. Hein., i, Sept., 1851, p. 193, footnote (Mexico; coll. Berlin Mus.?); Journ. f. Orn., 1861, p. 81; Ridgway, Man. N. Am. Birds, 2d. ed., 1896, p. 367, part.

(Callothrus) robustus, Ridgway, Man. N. Am. Birds, 1887, p. 589; 2d ed. 1896, p. 600.

Callothrus robustus, Ridgway, Man. N. Am. Birds, 1887, p. 594; Zeledon, An. Mus. Nac. Costa Rica, i, 1887, p. 112 (San Jose, Cartago, Naranjo de Cartago, and Alaguela, CostaRica); Stone, Proc. Ac. Nat. Sc. Phil., 1890, p. 208 (Yucatan), 212 (Orizaba); Cherrie, Auk, vii, 1890, p. 334 (San Jose, Costa Rica); ix, 1892, p. 250 (do); Attwater, Auk, ix, 1892, p. 237 (San Antonio, Texas, breeding); Richmond, Proc. U.S. Nat. Mus., xvi, 1893, p. 496 (San Carlos, Nicaragua); Bendire, Rep. U. S. Nat. Mus., 1893, p. 599 (descr., range, habits, etc.); Life Hist. N. Am. Birds, ii, 1895, p. 443, pl. 6, fig, 9; Singley, Rep. Geol. Surv. Tex., 1894, p. 371 (Rio Grande City; Hilalgo); Am. Orn. Union Check List, 2d ed., 1895, no. 495; Chapman, Bull. Am. Mus. Nat. Hist., viii, 1896, p. 280 (Chichen Itza, Yucatan; habits); Nehrling, Our Native Birds etc., ii, 1896 p. 246; Ridgway, Bull. U.S. Nat. Mus. 50, part ii, 1902, p. 201-203 (syn., descr. range.).

Tangavius involucratus, Lesson, Revue Zool., ii, 1839, p. 41.

Tangavius aeneus involucratus, A.O.U. Check List, 1910, p. 232; Friedmann, Auk, 1927, p. 507.

Tangavius aeneus assimilis

Molothrus aeneus (not *Psarocolius aeneus,* Wagler), Cassin, Proc. Ac. Nat. Sc. Phil., 1866, p. 18, part (Manzanillo Bay, Colima); Lawrence, Mem Bost. Soc. N. H., ii, 1874, p. 281, part (Manzanillo Bay; mountains of Colima); Bull. U. S. Nat. Mus., no. 4, 1876, p. 24 (Tapana, prov. Tehuantepec, Oaxaca); Sclater Cat. Birds Brit. Mus., xi, 1886, p. 334, part; Salvin, and Godman, Biol. Centr. Am., Aves, i, 1886, p. 451, part (Manzanillo Bay, etc., Colima; Tapana, Oaxaca).

(Molothrus) aeneus, Sclater and Salvin, Nom. Av. Neotr., 1873, p. 37, part.

(Molothrus) aeneus, Ridgway, Man. N. Am. Birds, 1887, p. 367, part.

(Callothrus) aeneus, Ridgway, Man. N. Am. Birds, 1887, p. 589, part; 2d ed., 1896, p. 600, part.

Callothrus aeneus assimilis, Nelson, Auk, xvii, 1900, p. 266 (Acapulco, Guerrero, s.w. Mexico; coll. U.S. Nat. Mus.); Ridgway. Bull. U.S. Nat. Mus. no. 50, part ii, 1902, p. 204-205 (descr., syn., range, etc.).

Tangavius aeneus assimilis, Friedmann, Auk, 1927, p. 508.

IX

THE EVOLUTION OF THE PRESENT COWBIRDS

In the course of this work on the parasitic habits of the Cowbirds it early became manifest that we could not get very far in any interpretation of the present condition of the cyclical instincts of the various species involved without first determining the probable course of evolution in these birds and the phylogenetic relationships of the existing forms. In tracing evolution backwards from data afforded by living species it is impossible to have too many distinct and independent lines of evidence, and accordingly I have critically compared and examined different phases of the life histories of all the species; have attempted to correlate facts with factors in all cases; and finally to piece together logically and undistorted the results of all these separate lines of argument.

1. Evidence afforded by Geographic Distribution

In studying the geographical distribution of any group of animals there are two things of prime importance. One is the region of origin and the other the mode of dispersal. In a general way it seems likely that those species still inhabiting the ancestral home of the group are its oldest members, while those occurring in surrounding areas are less ancient, and that the most recently evolved species are those in the periphery of the range of the genus, except in cases of extreme isolation. This is but natural for if a new variety (incipient species) were to appear in the center of the range it would be completely surrounded by individuals of the older, well established forms with which it might very possibly interbreed, and, in time, disappear or at least have only a small chance of survival. It has been rightly said that there is no struggle for existence, no competition for life, so keen as that between closely allied species, so that even if interbreeding would not largely obliterate the new variety, the changes of its survival would be much less than if it appeared on the edge of the range of its congeners where it could escape much of this struggle. Birds fit into little niches in nature, each niche being slightly different from all the others. If a new form of a previously existing species were to appear in the midst of its ancestral type the chances of its finding a vacant niche would be very small and its chance of survival would vary directly with its fitting into some such niche. On the other hand the individuals near the borders of the range might produce new forms which, on going further afield would find the *Cowbird* niche unoccupied and fit in easily. This is the same as is meant by the well-worn statement that evolution is faster where natural vacancies occur than elsewhere.

Most ornithologists are agreed that the genus *Molothrus* is South American in origin. Two of the three species occur only in that continent. (One of them ranges north to the West Indies.) Of the two South American species, one *M. bonariensis* ranges all over the continent from Patagonia to Panama, dividing into many local races. The other, *M. rufo-axillaris,* which is non-migratory, is found in the northern half of Argentina, in Uruguay, Paraguay, and southern Brazil and Bolivia. This general region may be taken as the original range of the genus. If we were to tabulate the species according to their present distribution in point of proximity to their ancestral home, we should find:—

1. *A. badius* and *M. rufo-axillaris*; 2. *M. bonariensis;* 3. *M. ater*

If the evidence from geographical distribution has any evolutionary significance, then the phylogenetic age of the species should run in the same order.

2. *Evidence from Habits*

A. *Courtship display*

If we arrange the courtship displays of the four species of Cowbirds from simplest to most complex we would get the following results:

1. *A. badius* and *M. rufo-axillaris;* 2. *M. bonariensis;* 3. *M. ater*

The first species, *A. badius,* has no display at all; *M. rufo-axillaris* and *M. bonariensis,* while differing from each other in some points, go through the performance of fluffing out their feathers and bowing forward with arched wings. They never bow over to more than a horizontal position while *M. ater* carries the display further until in its bowing it transcribes an arc of nearly 180 degrees. This type of display, i. e. ruffling the feathers and bowing or bending forward, is common to many Icteridæ such as *Agelaius, Quiscalus, Xanthocephalus, Cassidix, Cassicus, Ostinops, Gymnostinops,* etc., so that there is a definite tendency in the whole family to develop this type of courting attitude. From this it follows that *Molothrus* is duplicating within the genus the tendency of its family relations. Furthermore, I once kept two young males of *M. ater* in captivity through their first winter and the following spring they began to display. At first the display was crude and incomplete; then it reached a stage similar to that of *M. bonariensis* and finally to the full adult display of *M. ater.* No other Cowbirds were with them the whole time so the two individuals really went through the racial experience of the genus in perfecting their displays.

B. Song.

If we consider the song utterance of the various species of Cowbirds, and arrange them from simplest to most specialized, we would once more find the result to be:—

1. *A. badius* 2. *M. rufo-axillaris* and *M. bonariensis,* 3. *M. ater.*

A. badius has a primitive, formless type of song, consisting of little more than a chanting repetition of the same note at a fairly uniform rate of speed. *M. rufo-axillaris* and *M. bonariensis* both have true "Cowbird" songs and would be recognized as Cowbirds by sound by anyone familiar with the North American *M. ater,* but their songs are harsher and poorer in quality than that of *M. ater* which has the same type of song but clearer.

3. Evidence from Coloration

For reasons that cannot be gone into in this work, it is usually thought that black or blackish blue is a climax type of color while grays, whites, etc. are more primitive. If we apply this criterion to the Cowbirds we find that *A. badius* is the most primitive, and that there is a great gap between it and the other three species. Both *M. ater* and *M. bonariensis* have blackish males, (in *ater* the head is brown), and grayish females, and *M. rufo-axillaris* has black plumage in both sexes. However, if we take into consideration the evidence afforded by the coloration of the young, we find that the young of *M. rufo-axillaris* is identical in plumage with the young of *A. badius,* although the adults of the two species are very different. In *M. bonariensis* and *M. ater* the young are light brownish gray in color similar to, (but not exactly the same as), the adult females of the respective species. If we were to arrange the Cowbirds according to their coloration, we would get:—

1. *A. badius;* 2. *M. rufo-axillaris;* 3. *M. bonariensis* and *M. ater.*

Tangavius, the Red-eyed Cowbird, is doubtless an offshoot of the *rufo-axillaris* stock for it agrees with the latter in the following points:— 1. the dark coloration in the female (not as marked as in *M. rufo-axillaris* but still very dark for a Cowbird); 2. the late breeding season; 3. the courtship display is more like that of *M. rufo-axillaris* than any other species of Molothrus; 4. its song is fairly similar to that of the Screaming Cowbird. *Cassidix,* the parasitic Rice Grackle, is merely a large-sized *Tangavius* with a more highly developed cape.

Summing up the above arguments and correlating the evidence is facilitated by the close agreement of the independent results. Judging by geographical (distribution); biological, (habits); and structural (coloration) evidence the geneology of the Cowbirds may be expressed as follows:—

1. *A. badius*————2. *M. rufo-axillaris* 3. *Tangavius*—4. *Cassidix.*
3. *M. bonariensis*—4. *M. ater.*

X

THE ORIGIN AND EVOLUTION OF THE PARASITIC HABIT

The parasitic habit in birds has long attracted the interest and attention of men, and in consequence a great many writers have suggested explanations to account for the existence of so remarkable a mode of reproduction. Aristotle was the first, and since his time there has been a steady stream of theorizers and to discuss even briefly all the various suggestions that have been put forth would fill a large volume. Until a more than a century ago the European Cuckoo was the only bird known to be parasitic and all the hypotheses developed had to do with the Cuckoo, and not with the Cowbirds. However, people have almost always inclined to the opinion that one explanation would suffice for all groups of parasitic birds, so that many of the older theories have since been considered in connection with the Cowbirds although they were originally designed for application to Cuckoos only.

The explanations given by the ancients are, without much exception, interesting only from the historical point of view and need not be considered in this work. In fact only a very few of the purely cuculine explanations merit discussion here. So then, leaving out the mythological conceptions of the ancients, the first serious suggestion is that of Herrisant (1757) who thought that in the case of the European Cuckoo the bird was prevented from incubating because of faulty anatomy. He thought the stomach was too big and heavy and protruded too far ventrally so that if the Cuckoo were to sit on her eggs she would smash them. This was ably disproved by Gilbert White who dissected several Cuckoos and compared them with other birds. Many writers have thought that the source of parasitism is to be sought in the condition of polyandry which they supposed to exist in all parasitic birds. Pycraft and Fulton are among the best known exponents of this view. It may be that some parasitic Cuckoos are polyandrous but the Cowbirds are more or less monogamous and such polyandry as occurs in this group is a possible result, not the cause, of its parasitism. *Vidua macroura,* a parasitic Weaver-Bird *(Ploceidæ)* is also apparently monogamous, and Mr. Edgar Chance writes that, "Whether Cuckoos are polygamous, polyandrous, or promiscuous is a very open question. I am inclined to the belief that they are, at least often, promiscuous. I should not, however, lightly dismiss the theory that some pair as normal birds. . . ." Dr. Robert Fulton admits that the question of polyandry and parasitism is all in a circle—does polyandry cause parasitism or does parasitism cause polyandry? He inclines to the view that polyandry causes parasitism. In the Cowbirds the circle is still open and there can be no question but that parasitism is not caused by polyandry. However, it should be remembered that what holds for Cowbirds is not necessarily true for Cuckoos.

A very curious theory is that brought out by Widmann. He thought that the Cowbirds followed the buffalo too far away from their nests and could not get back in time to use them when their eggs were ready to be laid, but in emergencies used other nests. This theory is more interesting than suggestive. (See under Association with Cattle, p. 290.)

The best theory advanced as yet, and one which my studies tend to support in part, at least, is that of Prof. F. H. Herrick. This writer studied the cyclical instincts of birds and found that not infrequently different parts of the cycle are interrupted by various causes which result in a general lack of harmony between successive parts of the cycle. He suggested that the parasitic habit may have originated from a lack of attunement of the egg-laying and the nest-building instincts which resulted in the eggs being ready for deposition before a nest was ready for them. His theory was based largely on a study of the Black-billed Cuckoo[1] and a comparison of its life history with that of the European Cuckoo,[2] (which, of course, is parasitic, while the former is not).

He found that of all the perturbations which are apt to arise at almost any step in the cyclical sequence of instincts the commonest was a failure in the "adjustment of nest-building to the time of egg-laying," and it was at this point that he suggested the parasitic habit took its rise.

"The door is thus opened wide to parasitism in its initial stage, whenever the acceleration of egg-laying or the retardation of the building instinct becomes common, with or without irregularity in the egg-laying intervals." He applied this idea to both the Cuckoos and the Cowbirds and probably would have extended it to cover the parasitic Weavers and Honey-guides as well had he known of them at the time. He writes that, "Parasitism could never succeed as a general practice on a large scale, and the fact that it is a specialty of two families of birds, shows that it is probably correlated with a peculiarity which they possess in common.

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[1] *Coccyzus erythrophthalmus*

[2] *Cuculus canorus*

This is to be found in a change in the rhythms of the reproductive activities, leading to a change of instincts. . . . . As to the "why of this problem, that is, why has the normal rhythm of the reproductive cycle been disturbed . . . . nothing is certainly known. . . . ."

The first writer to see that one explanation would not serve for all the different groups of parasitic birds was G. M. Allen. In the chapter on parasitic birds in his admirable book[3] he discusses all the parasitic groups in a general way and ends by saying that one must be prepared to find that the parasitic habit has been acquired in more than one way, and independently in the different groups exhibiting this habit. Wisely refraining from offering an explanation of parasitism, he suggests several "possible ways of origin." One of the possibilities is that parasitism may have arisen from the occasional laying of eggs in strange nests by birds that are very sensitive to the ovarian stimulus provided by the sight of a nest with eggs resembling their own. This is substantiated by experimental evidence collected by Craig who found that in doves ovulation could be induced by comparable stimuli. In the case of the Flicker[4] ". . . . the presence of a nest egg to encourage them to keep on laying as if to attain a number whose contact stimulus would satisfy the brooding instinct. It may be that in the case of those ducks whose eggs seem so often to be laid promiscuously in nests of their neighbors, the mere sight of a nest with eggs resembling their own may act as a stimulus inducing them to add to the number." Chance's field observations on the European Cuckoo are more or less in accord with this idea as he believes that the sight of her victims building their nests acts as a stimulus to ovulation so that the female parasite has an egg ready to be layed five or six days later. This is also true of some of the Cowbirds.

However, I cannot agree with this suggestion as a possible origin of the parasitic habit unless it be accompanied or preceded by a marked reduction in the attachment of the bird of its own nest. Even if the sight of eggs in strange nests stimulated egg production in a bird that was not parasitic its own natural instincts would associate the resulting eggs with its own nest and the bird would probably lay them in its own nest, unless, as I said above, its attachment to its nest were greatly diminished. Then too, after it has laid the proper number of eggs, "whose contact stimulus would satisfy," its brooding instinct, it would normally begin to incubate and stop laying. If its nest-attachment were sub-normal in strength, the bird might then wander about to some extent and, on receiving more visual stimuli might revert to egg-laying. However in such a case, its own eggs would have a lessened chance of survival.

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[3] Allen, Glover M., Birds and Their Attributes. 1925.

[4] *Colaptes auratus*

Another possibility suggested is that if a bird got into the habit of breeding in old nests of other birds, it would be easy, ". . . . to imagine that the bird might not discriminate between a newly completed nest and one recently abandoned. The result would be that if the intruder laid in the new nest, its rightful owners would resent the intrusion and prevent the repetition of the act, even though they had themselves to bring up the unwelcome addition. It is likely, too, that the greater abundance of new than of deserted nests would favor the frequency of such mistakes until the parasitic habit would have become established."

This suggestion seems well founded and possesses the virtue of being simple. However even in this case, the actual origin of the parasitic habit is not explained. A possible method of evolution of the parasitic habit is suggested but no indication is given as to why the birds, if repulsed at a new nest, do not continue nest-hunting until they find an unoccupied one. Furthermore, birds that breed in old nests of other species do not normally lay the first egg on the same day that they first occupy the nest, but usually the possession of a nest seems to provide the stimulus necessary for egg-production. From this it follows that if a bird of such breeding habits did try to occupy a new nest it would either be repulsed by the rightful owners before it had a chance to lay, or by the time it did lay an egg, the rightful owners would have forsaken the nest and started to build elsewhere, leaving the new occupant to take care of its eggs just as if it had originally gone to an old nest to breed.[5]

In any discussion of the origin of the parasitic habit we must start with one of two assumptions. Either we must assume that the birds of the Cowbird group originally built their own nests and cared for their eggs and young in normal fashion, and later through some cause lost the nest-building and incubating instincts and became parasitic or we must accept the idea that the Cowbirds have been parasitic from the very beginning of their race. Obviously only one of these two assumptions can be true, but considerable difference of opinion prevails as to which we should accept and which reject. Because of the very nature of the problem it is extremely difficult if not impossible to prove absolutely the correctness of either view. It is unfortunate that we must start with an assumption rather than facts, but we should, on this account, be all the more careful to choose with greater caution and make the utmost use of every bit of guiding evidence we possess.

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[5] These remarks are not made from any desire to criticise the authors of the above mentioned theories, but merely in an attempt to separate the problem of the origin of the parasitic habit from that of the factors which influenced its subsequent evolution. Without doubt my own theories are equally open to comment.

The evidence points unmistakably to the view that the Cowbirds originally bred in normal fashion and that the parasitism is a secondarily acquired habit. The reasons for making this statement are:

1. The instincts of nest-building and incubation are so universally present in all groups of birds in all parts of the world that it seems likely that this is the primitive condition of the Cowbirds.

2. All the Cowbird's close relatives are nest-builders; in fact, its family, the Icteridæ, is known as a family in which the nest-building instincts reach their pinnacle of development. (Cowbirds here implies *Agelaioides, Molothrus, Tangavius,* and *Cassidix*, the last being really only a large edition of the Red-eyed Cowbird.)

3. Within the genera *Agelaioides* and *Molothrus* we find several stages in the evolution of parasitism exhibited by different species. The Bay-winged Cowbird, *A. badius,* uses other birds' nests and lays its eggs in them but incubates and rears its own young. Sometimes it makes its own nest. The Shiny Cowbird, *M. bonariensis,* is parasitic but has the parasitic habit very poorly developed, wasting large numbers of its eggs. Rarely it attempts to build a nest but in this it is never successful. This indicates that originally it built a nest but no longer knows how. The North American Cowbird, *M. ater*, is entirely parasitic but is not wasteful of its eggs. The Screaming Cowbird, *M. rufo-axillaris,* carries the evolution of the parasitic habit in a different direction to some extent in that it tends more towards specificity in hosts.

4. The parasitic Cowbirds (*Molothrus*) have definite breeding territories and are more or less monogamous. Howard has shown that the territory precedes the nest in the evolution of the instincts of guarding associated with reproduction. If the Cowbirds were parasitic from the very beginning it would be very hard to explain their territorial instincts. As elsewhere shown, (see under Sexual Relations), monogamy would not be of use to parasitic birds; in fact promiscuity would better serve their purpose. The fact that the Cowbirds are fairly monogamous indicates that they were monogamous originally and probably nested in normal fashion as all monogamous birds do.

5. The most primitive of the existing species of Cowbirds is, as we have seen in a previous section, the Bay-winged Cowbird. This species is the only one of its group that is not parasitic and doubtlessly represents the original condition of the Cowbird stock. Even if the Bay-wing

does not present the primitive breeding habit of the stock which gave rise to itself and its parasitic congeners, the common ancestor of the living species must have been originally of normal breeding habits. It is inconceivable to think of a long line of parasitic birds having no origin in normal nesting birds. This would, at most, only push the problem from our recent species to their theoretical ancestor, whose fossilized bones, if ever found, would give no information as to its breeding habits.

Probably most of the present species came into being after the parastic habit was formed.

From the above it seems safe to assume that parasitism is not the original condition in the history of the Cowbirds. The problem, then is not whether the Cowbirds were always parasitic or not, but how they lost their original habits and became parasitic.

We have seen that all the species of Cowbirds establish breeding territories and that the distinctness or the definiteness of the territory is most pronounced in the most primitive, non-parasitic, Bay-wing, while it is least definite, and at times, almost imaginary, in the Shiny Cowbird and the North American *Molothrus*. In the Bay-wing, and its offshoot, the Screaming Cowbird, the birds are practically always strictly monogamous and only one pair is to be found in a given territory. In the other two species, where the parasitic habits are better developed, the territories are distinct chiefly in districts where the species are not abnormally numerous; but where they are unnaturally abundant, the territorial instincts are not strong enough to stand unmodified against the pressure of Cowbird population. Distinctness of territory depends on the amount of what may be called "territorial protection" displayed by the male. In most birds the male establishes a breeding territory and protects it from the inroads of other males of its own species. The female sometimes has this instinct as well. In the parasitic Cowbirds we see that the birds have still retained the territorial desire but have lost most of the instinct to protect their breeding areas. The original factor involved in this loss is the reversal of the usual method of territorial acquisition in the most primitive of the Cowbirds. We have seen that birds, usually the males, establish their territories, and then chose a nesting site somewhere within that territory. The Bay-winged Cowbirds however, reverse this process. They leave the winter flocks in pairs and, instead of staking out their "claims" they look for old or even new nests in which to breed. They fight for these nests if necessary, and when once in occupation, they extend the territory radially around the nest. In this way the territory, instead of being the primary consideration, becomes a matter of only secondary importance and with this reduction of its significance, the instinct to defend it is correspondingly lessened. In this way the amount of "territorial protection" displayed by the male is decreased and in the more recent, parasitic species, where the protecting instincts are further reduced, the territory of any one male is very apt to be invaded by other males of its own species.

Futhermore, in the Bay-winged Cowbird, we have seen that the female has lost most of her protecting instinct and seems to spend most of what she has before laying eggs, after which the eggs are largely dependent on the male for protection. The female is always quite bold and fearless when away from the nest, but very shy and nervous when incubating. Apparently she has the instinct to conceal her eggs in a nest, usually not of her own building, but has very little desire to protect them once they are laid. If not for the protection of the male, (and very fearless he is), she would probably be unable to care for her eggs, and if the male should lose his protecting instinct the result would be that the female would have the instinct to lay (or conceal) her eggs in nests but not to care for them (or protect them). This would open an easy path to parasitism. If we examine the habits and instincts of the other Cowbirds we find that this is exactly what has happened. The males have lost their protecting instincts and we find that this loss is more complete in *M. ater* and *M. bonariensis* than in *M. rufo-axillaris.* The very fact that we still find these somewhat obscure, but yet real, stages in the loss of the protecting instincts only serves to emphasize the downward path these instincts have taken. So then, it may be said that the immediate cause of the origin of the parasitic habit in the Cowbirds was the loss of the protecting instinct of the male. The fact that the female, still earlier in the history of the group, lost most of her protecting instincts cannot be called a causative factor because as long as the male retained his instincts of defense, as in the Bay-winged Cowbird today, the birds were not parasitic. What caused the almost complete loss of these instincts in the male we cannot definitely say, but the factor which started the weakening, and finally brought their destruction was the reversal of the territorial and nesting habits. When the territory became of only secondary importance the impulse to protect it was correspondingly weakened. At the risk of seeming paradoxical it might almost be said that the fact that the ancestral Cowbirds cared more about the nest than the territory had much to do with the origin of the parasitic habit. The complex of reproductive instincts became unbalanced and eventually collapsed. In other words, the birds were more interested in a secondary than a primary consideration with the result that the former suffered much more than the latter.

Fortunately we have a clue to the way in which the male lost his protecting instincts. In order fully to appreciate its significance it is necessary to digress for a moment and consider the evolution of the Screaming Cowbird from the Bay-wing stock. As already indicated in a previous section the Screaming Cowbird is obviously a direct offshoot of the stock of which the Bay-winged Cowbird is the living example. The range of the Screaming Cowbird is wholly contained within that of the Bay-wing and in general the habitat or type of country occupied by the two species is the same. I always found both species in the same type of environment. It seems then that there could have been no geographical or ecological isolation in this case to preserve and differentiate the budding form which in its present state we call the Screaming Cowbird. Consequently the isolation necessary to preserve the distinctness of the newly arisen species must have been physiological. The physiological isolation was probably that of differential breeding seasons. Probably the original *rufo-axillaris* was an early breeding bird (*badius* is a later breeder). Although *rufo-axillaris* today is a late breeder, the facts that its courtship season comes early in the spring, and that it establishes its territories very early, point to the conclusion that it once was an early breeding bird as *bonariensis* and *ater* are today. Inasmuch as the Bay-wing is non-parasitic and inasmuch as the Screaming Cowbird is a direct offshoot of this stock it seems probable that originally the latter species was also non-parasitic. In other words the change between the normal and the parasitic mode of reproduction occured within the racial history of *M. rufo-axillaris.* Assuming that in most ways the original habits of the Screaming Cowbird were similar to those of the Bay-wing we should expect that the birds tried to breed in nests of Ovenbirds, Woodhewers, etc., but tried to do so early in the season. As elsewhere indicated the struggle for nests is much greater early in the season than later on, and the Screaming Cowbird were similar to those of the Bay-wing we should ex- instinct, probably could not succeed in this struggle. We have seen that sometimes Screaming Cowbirds establish territories in the spring, occupy them for considerable periods, and then desert them without ever having utilized them. This indicates very strongly that the weakened territorial instinct of the male is often insufficient to maintain its influence long enough to "make connections" with the somewhat more vernal development of the egg-laying instincts of the female. In this lack of attunement between the territorial instincts of the male and the egg-laying instincts of the female the parasitic habit probably had its origin. This lack of attunement seems to have been caused by the diminution of the protecting territorial instincts of the male and this diminution seems in turn to have been started by the reversal of the territorial and nest-building instincts in the stock from which the Screaming Cowbird evolved.

The parasitic habit undoubtedly developed separately in each of the groups of birds exhibiting this custom,—Cowbirds, Cuckoos, Weavers, Honey-guides, and Ducks. The two best known groups, the Cowbirds and the Cuckoos, form, in this way, one of the most striking examples of parallel evolution in the animal kingdom. The causes may have been different in the different groups; in fact I believe they were different in several respects but this matter together with a general consideration of the parasitic birds of the world are reserved for a future work. However, it may not be out of place to make a few general remarks on this subject. Assuming an original nest-building condition as the true state of affairs in the primitive Cowbirds and Cuckoos, the change that brought about the development of parasitism clearly affected the original nesting instincts. The Cuckoos never had highly developed nest-building habits and so when the factors causing the change began to operate, it was fairly easy for the Cuckoos to "let go" their poorly developed nesting instincts. This probably is true for the Honey-Guides (*Indicatoridæ*) as well. In the case of the passerine parasites the conditions were directly opposite in character, Here the nesting instincts were probably so highly specialized that when the factors began to bring their influence to bear, the birds could not accommodate themselves to the new conditions unless they changed radically themselves. It is of interest to note in this connection that among all the various and wide-spread families of the highest order of birds parasitism occurs in only two but in just those two in which the instincts of nest-building are developed to the very highest degree, the Hangnests, (*Icteridæ*) and the Weaver Birds, (*Ploceidæ*). In each of these two groups only a few species are parasitic; half a dozen Cowbirds and Rice Grackles, and a few Weaver Birds, showing that the change responsible for the origin of parasitism was an internal (physiological) and not an external (environmental) one. If the environment were responsible we should expect more birds to have been similarly affected.

Parasitism could not have originated and been successful until the great majority of birds had already gone far in the evolution of the instincts of nest-building, with its accompanied ideas of territory and attachment to the nest and nest-site, and the synchronous development of the incubating instinct. Not until the nesting instincts were very well developed would a bird tolerate interference in its nest without deserting, and in order to be strong, those instincts must be well developed.

A question that cannot be answered but that nevertheless keeps cropping up is whether parasitism originated very gradually in a large number of individuals comprising a group or a species or whether it began after the fashion of a mutation in a very few individuals. There is much to be said for both sides but neither leads us to any definite conclusion. The processes and methods of evolution are clear until we attempt to study any single case.

In conclusion we can do no better than to reiterate that the explanation here offered to account for the origin of the parasitic habit in the Cowbirds is by no means the last word on the subject and is offered as a suggestion more than anything else. It explains and simplifies the problem and is not incompatible with any definitely established facts as far as known. It is not meant to be applied to any parasitic birds except the Cowbirds but in this group it may eventually prove to hold true.

Before we can hope to progress very much further in our interpretations of the significance and modification of instincts we must learn much that is still unknown about the physiology of reproduction in birds, particularly the physiological basis of instinct and the ways in which the inner environment (i. e., the physiological condition), can be changed and modified so as to produce corresponding changes and modifications in its external manifestations, the instincts.

In the meantime, however, the field zoologist can help direct the steps of the physiologist by getting a composite picture of the various stages and degrees of parasitism exhibited by the different species of parasitic birds and by comparing and contrasting them to understand as far as he is able their significant points of resemblance and change. Careful, accurate field work is needed on all parasitic birds before we can hope to advance very far in our study. That there is still much to be learned about the Cowbirds must certainly be evident to any one who has read the present work.

APPENDIX A

THE RICE GRACKLE, *Cassidix oryzivora*

The only parasitic Icterid other than the true Cowbirds is the Rice Grackle, *Cassidix oryzivora.* This bird is in many ways merely a large edition of *Tangavius aeneus,* to which it is obviously related. For this reason I here append a summary of what is known of this bird.

Range—From southern Mexico to Paraguay, southern Brazil, and northeastern Argentina (Missiones). The species breaks up into three geographic races as follows.

1. *Cassidix oryzivora oryzivora*—Eastern South America, Venezuela, Trinidad, the Guianas, Brazil, Paraguay and N. E. Argentina.
2. *Cassidix oryzivora violea*—W. Ecuador, Colombia, Panama, Nicaragua and possibly Costa Rica.
3. *Cassidix oryzivora mexicana*—Southern Mexico south to British Honduras, Nicaragua and Costa Rica.

Migration—Non-migratory as far as known.

Courtship Display—The courtship display is unique but is foreshadowed by that of the Red-eyed Cowbird. The male elevates his nuchal cape and bends his head forward and down so that the bill rests for its entire length against the feathers of the breast. The eyes seem to be brought forward because the feathers of the cape and hind neck give the head a very wide, owl-like appearance. The body feathers are fluffed out and the tail drawn slightly under and forward. The bird does not bow forward as do the Cowbirds. The notes are unknown to me.

Territorial and Sexual Relations—Unknown.

Eggs and Egg-laying—Goeldi (Aves do Brazil, 1894, p. 284) first recorded the eggs and parasitic habits of the Rice Grackle. C. A. Lloyd (Timehri vol. 10, n.s. p. 37) wrote that *Cassidix* never built its own nests but layed in nests of *Ostinops decumanus.* He supposed these nests were all deserted and did not appreciate the fact that *Cassidix* was really a parasite. Kuschel (Ibis 1896 p. 585) recorded eggs of *Cassidix* from nests of *Cassicus persicus* near Para. He later (Journ. f. Orn. 1897, pp 168-170) recorded in full the discoveries of his field correspondent, Schultz. As many as six eggs of the Rice Grackle were found in one nest but most victimized nests had only one or two of the parasitic eggs. Kuschel described the eggs as oval or rounded oval, very coarse-grained, with many deep pores and a few undulating striations, dull or only slightly glossy, the ground color pale bluish green or white with a slight greenish tinge with some dark brownish-black specks and thick bent marks on the large end, the spots sometimes only shadowy, dull grayish. He states that the eggs of *Cassidix* resemble those of *Quiscalus* more closely than those of *Molothrus.* Crandall (Zoologica, 1914, p. 338) described the egg of *Cassidix* in Costa Rica as spotless white, rough in texture and slightly glossed, measuring 36.1 x 26.0 mm. Kuschel's description deals with the typical race, *Cassidix o. oryzivora,* while Crandall's refers to *C. o. mexicana.*

Eggs of *Cassidix oryzivora* have been found in nests of the following species.

Cacicus cela	British Guiana
Cassicus persicus	Brazil
Ostinops decumanus	British Guiana and Brazil
Ostinops cristatus	Brazil
Zarhynchus wagleri	Costa Rica and Panama
Cacius hœmorrhus	British Guiana

Hypothetical

Cacicus hœmorrhous	British Guiana

When about to lay, the Rice Grackles are very pugnacious in their determination to enter the nests of the prospective victims. Dr. Frank M. Chapman observed these birds in Barro Colorado, Canal Zone, Panama, and found that no matter how frequently the *Cassidix* were repulsed by the nest-builders (in this case *Zarhynchus wagleri*) they always came back and literally fought their way into the nests. This point is of considerable evolutionary interest and significance, as the Rice Grackle seems an offshoot of *Tangavius,* which in turn was derived from the *Molothrus rufoaxillaris* stock, and this Cowbird also exhibits to some degree this same pugnacity and determination when about to enter a nest. *Molothrus bonariensis* and *Molothrus ater* do not.

Young—In December, 1892, Goeldi was given a nest of *Ostinops cristatus* with 2 young birds. He noticed that one of the nestlings had no yellow in the tail feathers. As the birds grew up he found this one was a young *Cassidix oryzivora* while the other was a young *Ostinops cristatus.* This shows that the young *Cassidix* does not starve out the rightful young. (Goeldi had several similar cases under observation.)

The only notes we have on the ontogeny of the young *Cassidix* are those recorded by Crandall, who gives the following data.

1. Recently hatched bird—skin white with occipital, humeral, dorsal, and lateral tracts, as well as a slight scattering on the thighs, well covered with long dark gray down; beak white, gape much swollen and yellowish. The young bird was about 2 or 3 days old and was found in a nest of *Gymnostinops montezuma* together with one of the rightful young the same age as itself. "Its behavior was quite in contrast to that of *Gymnostinops* which shrunk to the bottom of the nest when disturbed, while the young interloper gaped eagerly for food. The two young birds were of approximately the same size and equally well nourished."

2. Nestling about 2 weeks old. Found April 26 in a nest of *Zarhynchus wagleri.* Crandall writes as follows:

"The feathers of the young bird were quite black, the legs and feet also black, iris dark hazel. The beak and bare portions of the face, including the lores, space in front of the eyes and base of the beak, which were bare of feathers, entirely white. The gape was pale yellow. The bird exhibited the greedy habits usual in parasites and soon was able to care for itself and was brought safely to the Zoological Park.

"On May 25th, faint signs of dark coloring were observed in the beak. These gradually increased, so that the change to the pure black of the adult was seen to be under way. The chief points of color increase were at each side of base and tip of both mandibles, although the patches were very irregular.

"On June 25, it was noted that the anterior portions of the face and the lores were covered with pin-feathers, which soon clothed these parts. The bill was now much darker, the white tracts being greatly restricted. By August 10, the change was practically complete, only faint traces of white at the tip of the upper mandible remaining."

Food—Not recorded.

LITERATURE CITED

ABBOTT, CLINTON G. 1909
A Cowbird's Nursery. Bird Lore XI no. 4 pp. 149-153.
ADAMS, E. Dec. 1897
Osprey II p. 55
ALBERGER, A. H. March 1890
Orn. and Ool. XV no. 3 p. 46
ALLEN, ARTHUR AUGUSTUS 1913
The Red-winged Blackbird. A Study in the Ecology of a Cat-tail Marsh. Proc. Linn. Soc. N.Y. 1913
——— 1913
An Opportunity Interrupted. Bird Lore XV pp. 296-300
ALLEN, GLOVER MORILL June 1909
Fauna of New England 11. List of the Aves pp. 137-138
——— 1925
Birds and Their Attributes. pp. 198-216
ALLEN, JOEL ASAPH June 3, 1868
Notes on Birds observed in Western Iowa. Memoirs Bost. Soc. Nat. Hist. I p. 493
——— Jan. 1870
Notes on Some of the Rarer Birds of Mass. Amer. Nat. III no. 11 p. 576
——— May 20, 1874
Notes on the Nat. Hist. of Portions of Dakota and Montana Territories, being the Substance of a Report to the Secretary of War on the Collections made by the North Pacific Railroad Expedition of 1873, Gen. D. S. Stanley, Commander. Proc. Bost. Soc. Nat. Hist. XVII pp. 58-59
——— 1876
Geographical Variations in the Number and Size of the Eggs of Birds. Bull. N.O.C. I p. 74-75
ALLEN, W. T. May 1881
Bird Notes from Virginia. Orn. and Ool. VI no. 3 p. 21-22
ALLISON, A. Oct. 1904
The Birds of West Baton Rouge Parish, Louisiana. Auk XXI no. 4 p. 479
ALPHONSUS, BROTHER, C. S. C. 1911-1912
Our Song Birds III. Amer. Midland Naturalist Vol. 2 p. 96.
——— C. S. C. 1913-1914
Daily Observations of Our Birds I. Amer. Midland Naturalist Vol. 3 p. 24-27
——— C. S. C. 1913-1914
Song Season of Our Birds in 1912. Amer. Midland Naturalist Vol. 3 p. 49
——— C. S. C. 1913-1914
Comparative Migration of Our Birds in Autumn. Amer. Midland Naturalist Vol. 3 p. 355

Anderson, R. M. March 1907
Birds of Iowa Proc. Davenport Acad. of Sci. XI p. 299, 300
Anon. Sept. 1881
Large Sets of Eggs. Orn. & Ool. Vol. VI no. 7 p. 53
——— Oct. 1882
Notes from Shelter Island. Orn. & Ool. VII no. 21 p. 167
——— Nov. 1882
Thrushes. Orn. and Ool. Vol. 7 no. 22 p. 170
——— Sept. 1889
Brief notes. Orn. and Ool. XIV no. 9 p. 143
——— April 1890
Orn. and Ool. XV no. 4 p. 58
——— July 1891
Orn. and Ool. XVI no. 7 p. 108
——— July 1891
Orn. and Ool. XVI no. 7 p. 109
——— March 1892
Oologist IX no. 3 p. 69
——— June 1892
Orn. and Ool. XVII no. 6 p. 95
——— Sept. 1892
Orn. and Ool. XVII no. 9 p. 133
——— (Stone, W. ?) Oct. 1913
Review of Baker's "Evolution of Adaptation in Parasitic Cuckoo's Eggs." Auk XXX no. 4 pp. 606-607
——— July 15, 1912
Oologist XXXI no. 6 p. 119
——— July 15, 1912
Oologist XXIX no. 7 p. 314
——— July 15, 1914
Nesting of Yellow Palm Warbler. Oologist XXXI no. 7 pp. 143-144
——— April 1919
Canadian Field Naturalist XXXIII p. 14
Aplin, O. V. 1894
On the Birds of Uruguay, with an Introduction and notes by P. L. Sclater Ibis 1894 pp. 149-314
Arnott, D. July 1890
A four-storied Nest. Orn. and Ool. XV no. 7 p. 98
Arthur, Stanley Clisby Jan. 1918
The Birds of Louisiana. Bull. V. Louisiana Dept. of Conservation p. 59
Attwater, H. P. Aug. 1887
Nesting Habits of Texas Birds. Orn. and Ool. Vol. 12 no. 8 Aug. 1887 p. 124
——— July 1892
List of Birds Observed in the Vicinity of San Antonio, Bexar Co., Texas. Auk IX no. 3 p. 237
Audubon, John James 1842
Birds of America. Vol. IV pp. 18, 22

Aughey, Samuel 1878
Notes on the Nature of the Food of the Birds of Nebraska. First Ann. Report of the U. S. Entom. Comm. Appendix II p. (33)

Averill, C. K. Sept. 1884
Two Connecticut Rarities. Orn. and Ool. IX no. 9 p. 112

Bagg, E. April 1913
A Strange Sparrow Roost. Auk XXX no. 2 pp. 275-276

Bailey, B. July 15, 1914
Cowbird's Eggs. Oologist XXXI no. 7 p. 143

Bailey, Florence Merriam 1902
Handbook of the Birds of Western United States pp. 287-288

Bailey, H. B. 1876
Notes on Birds found Breeding on Cobb's Island, Va. between May 25 and May 29, 1875. Bull. N.O.C. I. p. 27

——— Jan. 1887
Brown Thrush laying in the Nest of the Wood Thrush. Auk IV no. 1 p. 78

——— 1883
On a collection of Eggs from Georgia. Bull. N.O.C. p. 39

Bailey, H. H. Oct. 1906
Ornithological Notes from Western Mexico and the Tres Marias and Isabella Islands. Auk XXIII no. 4 p. 389

——— 1913
The Birds of Virginia. pp. 198, 199, 201, 276

Bailey, Vernon 1905
Birds Known to Eat the Boll Weevil. Bull. 22 Biol. Surv. p. 16

Bailey, W. L. (no date) 1869
Our Own Birds pp. 35-36

Baird, Spencer Fullerton 1860
In Ives Rept. Colorado River of the West Pt. V. Zoology 36th. Congress, 1st session, House Executive Documents vol. 14 p. 6

Baird, Spencer F., Brewer, Thomas M., and Ridgway, Robert 1874
N. Amer. Land Birds Ed. of 1905 Vol. II pp. 154-157

Baker, E. C. Stuart 1907
The Oology of Indian Parasitic Cuckoos Parts 1,2,3 Journal of the Bombay Natural History Society Vol. XVII, pp. 72-83, 351-374, 678-696.

——— July 1913
The Evolution of Adaptation in Parasitic Cuckoos' Eggs. Ibis Series 10 vol. I, no. 3 pp. 384-398.

Baker, E. C. Stuart Mar. 13, 1922
Cuckoos Some Theories about the Birds and their Eggs. Bull. B.O.C. cclxvii vol. XLII pp. 93-112

Baldamus, E. 1867
Ueber das Eierlegen des Kuckuks. Zeitschr. ges Naturwiss. XXX 100

——— 1853
Neu Beitrage zur Fortpflanzungs-geschicte des europaischen Kuckuks. Naumania III 307

Baldamus, E. 1892
Das Leben der europaischer Kuckucke. Nebst
Beiträgen zur Lebenskunde der übrigen parasitischen
Kuckucke und Stärlinge
Barber, E. A. 1878
Ornithological Notes
Amer. Naturalist XII no. 7 July 1878 pp. 477, 478.
Barnes, R. M. Aug. 1890
List of Birds Breeding in Marshall Co., Ill. Orn. and Ool. XV no. 8 p. 115
——— 1918
Some Queer Things. Oologist XXXV p. 109
Barrett, C. L. 1906
The Origin and Development of the Parasitical Habits in Cuculidæ. Emu VI pp. 55-60
Barros V, Rafael 1923
Aves de la Cordillera de Aconcagua Revista Chilena de Historia Natural XXV (1921) pp. 191-192
Barrows, W. B. July 1883
Birds of the Lower Uruguay. Bull. N.O.C. VIII no. 3 pp. 133-134
——— 1912
Michigan Bird Life, pp. 434, 437
——— Jan. 1921
New Nesting Areas of Kirtland's Warbler. Auk XXXVIII pp. 116-117
Barton, B. S. 1799
Fragments of the Nat. Hist. of Pennsylvania. Part I Ed. by O. Salvin 1883 p. 16
Beal, F. E. L. 1900
Food of the Bobolink, Blackbirds, and Grackles. U. S. Dept. Agr., Div. of Biol. Survey Bull. 13. pp. 22-30.
Beck, Herbert H. 1924
The Pennsylvania German Names of Birds. Auk XLI no. 2 April 1924 p. 294
Beckham, C. W. July 1883
A list of the Birds of Bardstown, Nelson Co., Kentucky. Jour. Cinn. Soc. of Nat. Hist. VI no. 2 p. 141
Beebe, Charles William, Hartley, G. Inness, & Howes, Paul Griswold. 1917
Tropical Wild Life in British Guiana. p. 141
Bendire, C. E. 1893
The Cowbirds. Rep. U.S.N.M. pp. 587-624
——— July 1895
Notes on the Ancient Murrelet. Auk XII no. 3 p. 276
——— 1895
Life Histories of North American Birds Vol. II Special Bulletin, Smithsonian Institution, U. S. Nat. Museum. pp. 23-25, 28-29, 276, 292, 304, 307, 311, 315, 436-441, 452, 460, 465, 481, 486, 496
Bennett, W. W. 1917
Bell's Vireo Studies (Vireo belli Aud.) Proc. Iowa Acad. of Science XXIV p. 286

BENT, A. C. 1901-1902
Nesting Habits of the Anatidæ in N. Dakota. Auk XVIII Oct. 1901 pp. 334, 336, Auk XIX Jan. 1902 p. 9, 11, 12 Auk XIX Apr. 1902 p. 166, 171, 173.
——— 1907-1908
Summer Birds of Southwestern Saskatchewan. Auk XXIV no. 4 Oct. 1907 pp. 419, 422, 423 Auk XXV no. 1 Jan. 1908 p. 28
BERGTOLD, W. H. 1917
A Study of the Incubation Periods of Birds. What Determines Their Lengths? p. 102
BERLEPSCH, HANS VON 1873.
Zur Ornithologie der Provinz Santa Catharina, Süd-Brasilian. Journ. f. Orn. xxi, pp. 249-251.
——— 1887
Systematisches Verzeichniss de von Herrn Ricardo Rohde in Paraguay gesammelten Vögel. Journ. f. Orn. XXXV pp. 10-11
BETTS, N. DE W. 1913
Birds of Boulder Co., Colorado. p. 204
BICKNELL, E. P. 1882
A Review of the Summer Birds of a Part of the Catskill Mts. Trans. Linn. Soc. of N.Y. vol. 1 p. 159-180.
——— 1885
A Study of the Singing of our Birds. Auk II no. 2 p. 152-154
BISHOP, H. E. June 1916
The Cowbird's Bad Habits Country Life in America. June 1916 p. 68
BISHOP, L. B. 1910
Two new subspecies of North American Birds. Auk XXVII pp. 59-63
BLACKWELDER, E. Oct. 1909
Summer Birds of Iron Co., Mich. Auk XXVI no. 4 p. 368
BLANCHAN, NELTJE (Mrs. N. B. DeG. Doubleday) 1903
Bird Neighbors p. 50
BLINCOE, B. J. June 1921
Two Bachman's Sparrows' Nests near Bardstown, Kentucky. Wilson Bull. XXXII no. 2 June 1921 p. 100
BOIES, A. H. July 1884
Stray Notes. Orn. and Ool. Vol. IX no. 7 p. 90
BONAPARTE, CHARLES 1824
Observations on the Nomenclature of Wilson's Ornithology. Journ. Ac. Nat. Sci. Phila. IV pp. 48-49
BORRADAILE, L. A. 1923
The Animal and its Environment. p. 129
BOWLES, J. H. Jan. 1895
Notes on the Parula Warbler. Nidiologist Vol. II no. 5 p. 64
——— April 1906
A List of the Birds of Tacoma, Washington and Vicinity. Auk XXIII no. 2 p. 145
BRADFORD, C. H. 1928
California Bush-Tit Imitating Yellow Warbler.
Oologist, XLV no. 4 pp. 45-46

Brehm, A. E. 1882

Die Vogel, Erster Band Brehms Thierleben-Zweite Abtheilung-Vogel p. 240

Brewster, Wm. 1876

Some Observations on the Birds of Ritchie County, W.Va. Annals Lyceum of Nat. Hist. of N.Y. XI p. 141

——— July 1878

Descriptions of the First Plumage in various Species of N. Amer. Birds. Part III Bull. N.O.C. III no. 3 p. 123

——— 1882

Cuckoos Laying in the Nests of Other Birds Bull. N.O.C. VII p. 57

——— April 1882

On a Collection of Birds Lately made by Mr. F. Stephens in Arizona. Bull. N.O.C. VII no. 2 p. 85

——— Oct. 1903

Further notes on the Philadelphia Vireo, with Description of the Nest and Eggs. Auk XX no. 4 p. 370

——— 1906

The Birds of the Cambridge Region. Memoirs of the Nuttal Orn. Club. no. IV pp. 240-241

Brodkorb, Pierce April 1926

Notes from Southwestrn Michigan. Auk XLIII no. 2 pp. 249-250

Brown, Herbert Jan. 1903

Arizona Bird Notes

Auk XX. no. 1 p. 47.

Bruner, L. 1896

Nebraska Birds. Reports of the Nebraska State Horticultural Soc. p. 125

Bryant, H. C. Sept. 1914

A Survey of the Breeding Grounds of Ducks in California in 1914. Condor XVI pp. 228-229-230

Buffon—Comte de 1824

Oeuvres completes de Buffon avec les descriptions anatomiques De Daubenton, son collaborateur. Nouvelle Edition Dirigee Par. M. Lamouroux Oiseaux Tome III Paris. Chez Ladrange et Verdiere p. 409

Burleigh, Thomas D. June 1923

Notes on the Bird Life of Allegheny County, Pennsylvania. Wilson Bull. XXXV no. 2 June 1923 pp. 90-91

——— Oct. 1923

Notes on the Breeding Birds of Clark's Fork, Bonner County, Idaho. Auk XL no. 4 Oct. 1923 p. 659

Burns, F. L. 1901

Three Days with the Warbler. Wilson Bulletin VIII pp. 40, 42

——— Mar. 1921

Comparative Periods of Nestling Life of Some North American Nidicolæ. Wilson Bull. XXXIII no. 1 pp. 12, 15

Burroughs, John 1904

Outing Vol. XLV p. 246

Burtch, Verdi Dec. 1910

Nesting of the Hermit Thrush. Oologist XXVII no. 12 p. 139

C., F. H. Sept. 1884
Notes from Rehoboth, Mass. Orn. and Ool. IX no. 9 p. 113

Cabanis, J. 1848
Vogel—in Fauna und Flora von British Guiana in Richard Schomburgh's "Reisen in British Guiana" III p. 682

Cahn, A. R. 1918
Notes on the Vertebrate Fauna of Houghton & Iron Counties, Michigan. Trans. Wisconsin Acad. of Science, Arts and Letters XIX p. 497

——— Dec. 1920
Bird Notes from Itasca Co., Minn. Wilson Bull. XXXII no. 4 p. 116

Cameron, E. S. 1907-1908
Birds of Custer & Dawson Counties, Montana Auk XXIV no. 4 Oct. 1907 pp. 396, 397. Auk XXV no. 1 Jan. 1908 pp. 39, 41, 42, 43

Capen, E. A. 1886
Oology of New England p. 52

Carlton, E. P. Feb. 1891
Flycatcher Notes. Oologist VIII no. 2 p. 27

Carriker, M. A. 1910
An Annotated List of the Birds of Costa Rica Including Cocos Island. Annals Carnegie Museum, vol. vi, pp. 831-832

Carter, J. D. 1906
A June Trip to Pocono Lake, Munroe Co., Pa. Cassinia no. X. p. 32

Cassin, John 1866
A Study of the Icteridæ. Proc. Phila. Acad. Sci. 1886 p. 403

Center, G. H. April 1885
House Wrens reared by Robins. Orn. and Ool. Vol. 10 no. 4 p. 64

Chamberlain, Ralph V. 1908
Animal Names and Anatomical Terms of the Goshute Indians. Proc. Acad. Nat. Sci. Phila. p. 83.

Chance, Edgar Jan. 1919
Observations on the Cuckoo. British Birds XII no. 8. pp. 182-184

——— Aug. 9, 1919
A Second Summer's Observation of the Cuckoo. Country Life p. 182

——— Sept. 1, 1919
Observations on the Cuckoo. British Birds, XIII no. 4 pp. 90-95

——— March 1, 1921
A Third Season's Observations on a Cuckoo. British Birds XIV no. 10 pp. 218-232

Chance, Edgar 1922
The Cuckoo's Secret. London, Sidgwick & Jackson, Ltd.

Chaney, R. W. July 1910
Summer and Fall Birds of the Hamlin Lake Region, Mason County, Mich. Auk XXVII no. 3 p. 275

Chapman, Frank Michler 1896
Notes on Birds Observed in Yucatan. Bull. A.M.N.H. VIII Art. XVIII p. 280

——— July 1898
Probable Polygamy of the Great-tailed Grackle. Auk XV p. 269

Chapman, Frank Michler 1900
Bird Life p. 176
——— 1901
Economic Value of Birds to the State. 7th Report of the Forest, Fish and Game Comm., N.Y. p. 154
——— 1907
Warblers of N. Amer. pp. 33, 255, 266-267
——— 1909
Abstract of a Paper given by, before the Linn. Soc. of N.Y. May 26, 1908 Abstract. Proc. Linn. Soc. of N.Y. For the year ending March 9, 1909 p. 17
——— 1915
Diagnosis of Apparently New Colombian Birds IV. Bull. Am. Mus. Nat. Hist. vol. 34, 1915 pp. 635-662
——— 1917
Distribution of Bird Life in Colombia. A Contribution to a Biological Survey of South America. Bull. Am. Mus. Nat. Hist. XXXVI p. 631
——— 1917
Handbook of Birds of Eastern N. Amer. Revised ed. 1917. pp. 76-77; 359-360
Chapman, Frank Michler 1926
The Distribution of Bird Life in Ecuador. Bull. Amer. Museum Nat. Hist. LV p. 697
Cherrie, George K. 1892
Preliminary List of the Birds of San Jose, Costa Rica. Auk p. 25
Childs, J. L. 1909
Long Island Bird Notes Warbler V p. 9
Chubb, Charles 1921
The Birds of British Guiana Vol. II p. 564
Clark, Austin Hobart Oct. 1905
Birds of the Southern Lesser Antilles Proc. Bost. Soc. Nat. Hist. XXXII no. 7 pp. 281-282
Clark, J. N. April 1881
Hooded Warblers. Orn. and Ool. no. 2 p. 10
Clayton, W. J. 1914
Nesting of the Yellow Palm Warbler. Oologist XXXI pp. 143-144
Cleaves, Howard H. June 1916
A Feathered Imposter. Country Life in Amer. pp. 70-72
Cohen, D. A. Dec. 1897
California Notes. Osprey II p. 56
Congdon, R. T. 1904
Saskatchewan Birds. Wis. Acad. of Science, Arts and Letters Trans. Vol. XIV pp. 577, 585, 588
Cook, A. J. 1893
Birds of Michigan p. 88
Cooke, W. W. 1884
Bird Nomenclature of the Chippewa Indians. Auk I p. 245
——— 1888
Report on Bird Migration in the Mississippi Valley in 1884 and 1885. U. S.

Dept. of Agr. Div. of Econ. Orn. Bull. 2 p. 161
Oct. 1914
Some Winter Birds of Oklahoma Auk XXXI no. 4 pp. 482-483

Cory, C. B. April 1886
The Birds of the West Indies, Including the Bahama Islands, the Greater & The Lesser Antilles, Excepting the Islands of Tobago and Trinidad. Auk III no. 2 p. 220

Coues, Elliott. 1872
Key to N. Amer. Birds p. 155

——— 1874
Birds of the Northwest: A Hand-Book of the Ornithology of the Region Drained by the Missouri River and its Tributaries. Dept. of the Interior, U. S. Geol. Surv. Terr. Misc. Publ. no. 3 pp. 164, 180-186

——— 1878
The Birds of the Colorado Valley Part First. Passeres to Laniidæ (All Published). Department of the Interior; U. S. Geol. Survey of the Territories: F. V. Hayden, U. S. Geologist in charge. Miscellaneous Publications—no. 11 pp. 505, 513, 533

——— 1878
Field Notes on Birds Observed in Dakota and Montana along the forty-ninth parallel during the seasons of 1873 and 1874. Bull. U. S. Geol. and Geogr. Surv. Terr. IV, no. 3, July 29, 1878 pp. 588-589, 597, 608, 612

——— July 1884
Egg of the Cowbird in Nest of the Carolina Dove. Auk Vol. I no. 3 p. 293

Craig, W. 1913
The Stimulus and the Inhibition of Ovulation in Birds and Mammals. Jour. Animal Behavior Vol. 3 no. 3 pp. 215-221

Crandall, C. W. Sept. 1891
Orn. and Ool. XVI no. 9 p. 139

Crandall, Lee S. 1914
Notes on Costa-Rican Birds. Zoölogica Vol. I no. 18 pp. 338-339

Croft, J. M. April 1882
Notes from Florence Springs, M.T. Orn. & Ool. Vol. no. 14 p. 107

Crosby, M. S. Jan. 1923
Supplementary Notes on the Birds of Dutchess County, N.Y. Auk XL no. 1 p. 103

Currie, R. P. Nov. 1892
The Chestnut-collared Longspur. Oologist IX no. 11 p. 243

Currier, E. S. Jan. 1904
Summer Birds of Leech Lake, Minnesota Auk XXI no. 1 p. 37

Daniels, E. S. Nov. 1915
Brown Thrasher and the Cowbird Bird Lore XVII pp. 458-459

Daniels, E. S. and Tatum, G. F. 1918
Yellow Warbler vs. Cowbird. Bird Lore XX pp. 226-227

Davie, Oliver 1889
Nests and Eggs of N. Amer. Birds pp. 272, 317, 351, 365-367, 373, 428, 430

Davison, J. L. July 1887
Birds Laying their Eggs in the Nests of Other Birds. Auk IV no. 3 pp. 263-264
Dawson, William Leon 1903
The Birds of Ohio Vol. I p. 15
——— Jan. 1916
A Personal Supplement to the Distributional List of the Birds of California. Condor XVIII p. 28
DeKay, J. R. 1844
Zoology of New York. Part II Birds p. 143
de Saussure H. 1859
Observations sur les Moeurs de Divers Oiseaux du Mexique Bibliotheque Universelle Archives des Science Physiques et Naturelles. Tome Quatrieme-Nouvelle Periode. Geneva p. 29
Devincenzi, Garibaldi J. 1925
Notas ornitologicas Anales del Museo de Historia Natural de Montevideo Serie II, Tomo II, Entrega I, p. 95
Dickey, D. R. and Van Rossem, A. J. 1922
Distribution of Molothrus ater in California with the Description of a New Race. Condor XXIV pp. 206-210
Dickey, S. S. June 15, 1912
The Cerulean Warbler Nesting in Greene Co., Pa. Oologist XXIX no. 6 p. 302
——— Aug. 15, 1914
The Carolina Wren. Oologist XXXI no. 8 pp. 158-160
Dinelli, Luis 1924
Notas Biologicas sobre Aves del Noresta de la Argentina. El Hernero III pp. 255, 257-258
Doan, W. D. Dec. 1888
Birds of West Virginia. Bull. 5, W. Va. Agri. Exp. Station, p. 68
Dove, H. S. April 1920
Notes on Parasitism. Emu XIX p. 304
Drew, F. M. Jan. 1885
On the Vertical Range of Birds in Colorado. Auk II no. 1 p. 16
Dubois, A. D. 1911
Oologist XXVIII p. 193
——— 1918
An Annotated List of Birds Observed from May to July in Central Logan Co., Ill. Oologist XXXV p. 144
Duges, A. 1896
The Cowbird, Molothrus ater. World's Congr. Ornith. pp. 179-180
Duges, E. 1897
El Tordito (Molothrus ater (Bodd.) Gray). La Naturaleza Ser II Tomo II pp. 103-105
Dugmore, A. R. 1902
Bird Homes pp. 175, 47
Dunlop, W. W. 1883
The Cowbird, Molothrus ater Bodd. Canadian Sportsman & Naturalist Vol. III pp. 240, 241

Dwight, Jonathon, Jr. 1899
The Sequence of Plumages and Moults of the Passerine Birds of New York. Annals N.Y. Acad. of Science Vol. XIII part 1 p. 159

Eames, E. H. Jan. 1893
Notes from Connecticut. Auk X no. 1 pp. 89-90

Eaton, Elon Howard 1909-1914
Birds of New York N.Y. State Museum Memoir 12. Vol. I 1909 local lists by counties. Vol. II 1914 pp. 226-229, 410, 429, 444

Edson, W. L. G., and Harvey, R. E. Aug. 1914
Happy Family. Oologist XXXI no. 8 p. 155

Edwards, C. L. Jan. 1886
The Relation of the Pectoral Muscles of Birds to the Power of Flight. Am. Nat. Vol. XX no. 1 pp. 27-28

Eifrig, G. Sept. 1915
Field Notes from the Chicago Area. Wilson Bull. XXVII no. 3 pp. 418, 520

Elder, H. E. July-Aug. 1921
The Cowbird: A Parasite. Bird Lore XXIII no. 4 pp. 185-191

Eliott, H. W. Jan. 1889
The Cowbird as a Fly Destroyer. Auk VI no. 1 p. 72

Emory, W. H. 1848
Notes of a Military Reconnaissance from Fort Leavenworth in Missouri to San Diego in California, including parts of the Arkansas, Del Norte, and Gila Rivers p. 26

Euler, Carl. 1867
Beiträge zur Naturgeschichte der Vögel Brasiliens. Jour. f. Orn. XV, pp. 415-417.

Euler, Carlos. 1900
Descripcao de nìnhos e ovos das Aves do Brazìl. Revìsta do Museo Paulista, iv, pp. 35-36

Evans, A. H. 1900
Birds—Cambridge Nat. Hist. IX p. 582

——— 1922
Notes on the Life-History of Cuculus canorus, with exhibition of eggs. P. Z. S. part 1 pp. 197-199

Everman, B. W. Jan. 1889
Birds of Carrol Co., Indiana, Auk VI no. 1 pp. 23-24

——— 1920
Notes on the Birds of Carroll, Monroe, and Vigo Counties, Ind. Proc. Ind. Acad. of Science pp. 354) 357, 379, 385, 386

Eyer, B. F. 1900
The Birds of Kansas pp. 63, 78

Fannin, John Oct. 1894
The Canada Goose & Osprey Laying in the same Nest. Auk XI no. 4 p. 322

Farley, F. L. May 1919
The White Pelican, Pelecanus erythrorhynchus, in Alberta. Canadian Field Naturalist Vol. XXXIII p. 39

Ferry, J. F. April 1910
Summer Birds of Saskatchewan. Auk XXVII no. 2 pp. 199-200

Fields, E. A. June 1914
A Two-story Yellow Warbler's Nest. Wilson Bull. XXVI no. 2 p. 103
——— June 1914
Cowbirds Monopolizing a Red-eyed Vireo's Nest. Wilson Bull. XXVI no. 2 p. 103
Fiehrig, Carlos Aug. 1921
Notes on Paraguay Birds El Hornero Vol. II no. 3
Figgins, J. D. Oct. 1923
The Breeding Birds of the Vicinity of Black Bayou and Bird Islands, Cameron Parish, Louisiana. Auk XL no. 4 Oct. 1923 p. 676
Finn, Frank 1919
Bird Behaviour p. 198
Fish, E. E. 1883
Cow Bunting. Bull. Buffalo Naturalists' Field Club I p. 46
Fleming, J. H. Jan. 1907
Birds of Toronto, Canada, Part II Land Birds. Auk XXIV no. 1 p. 78
Forbush, Edward Howe. 1907
Useful Birds and Their Protection. Mass. Board of Agriculture. pp. 330-322
French, Gilman M. Sept. 1907
Some Birds of Southwest Colorado. Condor IX p. 156
——— July 1908
Birds on the Navajo Reservation in New Mexico. Condor X p. 148
——— Sept. 1909
Red-eyed Cowbird at Sacaton, Ariz. Condor XI p. 173
——— March 1915
A Forty Acre Bird Census at Sacaton, Ariz. Condor XVII p. 88
Friedmann, Herbert. Oct. 1925
Notes on the Birds Observed in the Lower Rio Grande Valley of Texas during May, 1924. Auk XLII no. 4 Oct. 1925 pp. 537-554
——— 1927
Testicular Assymetry and Sex Ratio in Birds. Biol. Bull., lii, no. 3, pp. 197-207
——— 1927.
Notes on Some Argentine Birds. Bull. Mus. Comp. Zool. lxviii, no. 4, pp. 220-227
——— 1927.
A Revision of the Classification of the Cowbirds. Auk, pp. 495-508
——— 1927.
A Case of Apparently Adaptive Acceleration of Embryonic Growth Rate in Birds. Biol. Bull. liii, no. 5, pp. 343-345
Fry, H. J. Jan. 1916
A Study of the Seasonal Decline of Bird Song. Auk XXXIII no. 1 p. 35
Fulton, Robert. 1903
The Kohoperoa or Kœkœa, Long-tailed Cuckoo (Urodynamis taitensis): An Account of its Habits, etc., etc. Trans. N. Zealand Institute XXXVI pp. 113-148
Gabrielson, I. N. June 1914
Breeding Birds of an Iowa Farm. Wilson Bull. XXVI no. 2 p. 78-80

GABRIELSON, I. N. June 1914

Ten Days' Bird Study in a Nebraska Swamp. Wilson Bull. XXVI no. 2 p. 54

——— Dec. 1915

The Home of the Great Crest. Wilson Bull. XXVII no. 4 p. 435

——— 1919

The Birds of Marshall Co., Iowa. Proc. Iowa Acad. of Science XXVI pp. 59-60, 68-69

GAMBEL, WM. Dec. 1847

Remarks on the Birds observed in Upper California with descriptions of New Species. Jour. Acad. Nat. Sci. Phila. Vol. I 2nd series part 1 p. 49

GANIER, A. Sept.-Oct. 1899

Odd Nesting. The Hummer Vol. I nos. 5 and 6 p. 5

GAULT, B. T. 1902

A Song Sparrow's Nest. Wilson Bull. IX p. 15-16

GENTRY, T. G. 1874

On Habits of Some American Species of Birds. Proc. Ac. Nat. Sci. Philadelphia pp. 96-97

——— 1876

Life Histories of Birds of Eastern Penn. Vol. I pp. 355-357

GIBBS, MORRIS. 1890

A Very Peculiar Bird. Orn. and Ool. XV no. 1 pp. 5-8

——— Sept. 1894

Nesting Habits of the Hooded Warbler. Oologist XI no. 9 p. 278

GIBSON, ERNEST. 1880

Ornithological Notes from the Neighborhood of Cape San Antonio, Buenos Aires. Ibis 4th series Vol. IV p. 15

——— 1918

Further Ornithological Notes from the Neighborhood of Cape San Antonio, Province of Buenos Aires. Part I, Passeres. Ibis, pp. 390-391

GIDDINGS, H. T. Oct. 1897

Osprey II p. 26

GIEBEL, C. G. 1875

Thesaurus Ornithologiæ. Zueiter Band. Leipzig. pp. 609-610

GILES, R. T. July 15, 1915

A Cuckoo Mixup. Oologist XXXII no. 7 p. 112

GILMAN, M. F. 1914

Breeding of the Bronzed Cowbird in Arizona. Condor Vo. XVI pp. 255-259 2 photos

GIRAUD, J. P., JR. 1844

The Birds of Long Island p. 140

GLOGER, C. W. Z. 1854

Das geschlechtliche Verhaltniss bei den nicht selbst brutenden Vögeln. Jour. f. Ornith. 11, 1854, pp. 137-143

GLOVER, T. W. Sept. 1888

Large Set of Eggs of the Yellow Warbler. Orn and Ool. XIII no. 9 p. 134

GOELDI, E. A. 1897

On the Nesting of Cassicus persicus, Cassidix oryzivora, Gymnomystax melanicterus, and Todirostrum maculatum. Ibis pp. 361-370

GOELITZ, W. A. 1917
Large Sets of 1915. Oologist XXXII p. 147
——— 1915
Cowbird Notes. Oologist XXXII p. 152
——— 1916
The Lazy Bird. Oologist XXXIII p. 146-147
GOODALL, J. M. 1923
Remarks on Eggs of Argentine and Canadian Cowbirds. Bull. Brit. Orn. Cl., xliii, p. 63
GOSS, N. S. April 1884
Notes on the Nesting Habits of Yellow-throated Vireo. Auk Vol. I no. 2 p. 125
——— 1891
History of the Birds of Kansas pp. 395-396
GRAHAM, R. 1916
Nesting Dates of Texas Birds. Oologist XXXIII p. 81
——— 1916
Notes from Camp Graham at Lake Worth, Nine Miles Northwest of Ft. Worth, Texas. Oologist XXXIII p. 137
——— 1919
Bird Notes. Oologist XXXVI p. 180
GRANT, CLAUDE H. B. Jan. 1911
List of Birds Collected in Argentina, Paraguay, Bolivia, and Southern Brazil, with field notes Part I Passeres. Ibis 9th series Vol. 5 pp. 104-105, 107, 131
GREEN, J. B. 1887
Icteridæ Found Nesting near Des Moines, Iowa. Orn. and Ool. XII no. 6 p. 91
GREEN, T. R. 1917
Strange Nesting Site of the Wood Pewee. Oologist XXXIV p. 194
GREENE, T. G. April 1892
The Nesting of the Blue-headed Vireo, at Fitchburg, Mass. Wilson Quarterly Vol. IV no. 1 pp. 8-9
GREGG, W. H. June 1891
Catalogue of Birds of Chemung County, Proc. Elmira Acad. of Science Vol. I no. 1 p. 26
GRINNELL, GEO. BIRD. 1876
Zoological Report Chap II in Ludlow, Wm. Report of a Reconnaissance from Carroll, Montana Territory, on the Upper Missouri, to the Yellowstone National Park, and Return, made in the Summer of 1875. War Dept., Wash. Gov. Printing Office, p. 82
GRINNELL, JOSEPH. 1909
A New Cowbird of the genus *Molothrus,* with a Note on the probable genetic relationship of the North American forms. Univ. Cal. Pub. Zool. 5 pp. 275-281
——— March 20, 1914
An account of the Mammals and Birds of the Lower Colorado Valley, with Especial Reference to the Distributional Problems Presented. Univ. Calif. Publ. in Zool. XII no. 4 pp. 156-160

GRINNELL, JOSEPH Oct. 21, 1915
A Distributional List of the Birds of California. Pacific Coast Avifauna no. 11, pp. 101.

GRISCOM, LUDLOW. 1923
Birds of the New York City Region. American Museum Nat. Hist., Handbook Series, no. 9, pp. 20, 29, 246.

GROVE, B. H. 1913
The Influence of the Development of Agriculture in Wyoming upon the Bird Fauna. Amer. Nat. XLVII p. 312

GRUNDTVIG, F. L. 1894
On the Birds of Shiocton in Bovina, Outagamie County, Wis., 1881-83. Translated by C. E. Faxon. Wis. Acad. Sci. Trans. Vol. X p 122

H., G. L. July 1892
Oological Notes. Orn. and Ool. XVII no. 7 pp. 102-103

——— Jan. 1893
Abnormal Coloring of a Song Sparrow's Eggs. Orn. and Ool. XVIII no. 1 p. 13

HALES, HENRY. 1904
Cowbird and White-eyed Vireo. Bird Lore VI p. 99

HANCOCK, J. L. March 1883
Albino Cowbird. Orn and Ool. VIII no. 3 p. 24

HANNA, W. C. 1928
Notes on the Dwarf Cowbird in California. Condor p. 161

HARLOW, R. C. 1911
The Center Furnace Swamp. Cassinia XV p. 22

——— Oct. 1912
Breeding Birds of Southern Center Co., Pa. Auk XXIX no. 4 p. 473

HARRINGTON, P. 1915
Ontario 1914 Nests. Oologist XXXII p. 99

HARTERT, ERNEST and VENTURI, SANTIAGO. Dec. 1909
Notes Sur les Oiseaux de la Republique Argentine. Novitates Zoölogicæ XVI no. 2 pp. 184, 185, 230

HARVEY, W. G. and R. C. July 1, 1919
Bird Notes from Mackay (Queensland). Emu XIX p. 41

HATHAWAY, H. S. Oct. 1913
Notes on the Occurrence and Nesting of Certain Birds in Rhode Island. Auk XXX pp. 555, 557

HEADLEY, F. W. 1895
The Structure and Life of Birds. pp. 337-341

HELLMAYR, C. E. 1917
Beschreibung von sechs neuen neotropischen Vogelformen, nebst einer Bemerkung uber *Ampelion cinctus* (Tsch.) Munchen Verhandl. Orn. Ges. XIII, 1917 pp. 106-119

——— 1920
Miscellanea Ornithologica V. Munchen Verhandl. Orn. Ges. XIV, pp. 281-287

HENNINGER, W. F. Oct. 1902
A New Foster-Parent of the Cowbird. Auk XIX pp. 400-401

HENNINGER, W. F. 1902
Preliminary List of Birds of Middle Southern Ohio. Wilson Bull. IX p. 86
——— 1906
Preliminary List of Birds of Seneca Co., Ohio. Wilson Bull. XVIII pp. 54, 56
——— March 1915
June Birds of Laramie, Wyoming. Wilson Bull. XXVII no. 1 p. 232
HENSHAW, H. W. 1875
Report upon the Ornithological Collections U. S. Geographical Surveys West of the 100th Meridian. Vol. V Chap. III p. 308
HERISSANT. 1757
Abstract of an Anatomical Observation upon the Organs of Digestion in the Bird called Cuckoo. London Magazine, or Gentlemen's Monthly Intelligencer, Vol. XXVI pp. 29-30
HERRERA, PROF. D. ALPHONSO L. 1891
Apuntes de ornithologia—La emigracion en el Valle de Mexico. La Naturaleza—Periodico Cientifico de la Sociedad Mexicana de Historia Natural—Segunda Serie—Tomo I, p. 180
HERRICK, FRANCIS HOBART. 1905
Home Life of Wild Birds. pp. 222-223
——— 1907
Analysis of Cyclical Instincts of Birds. Science Vol. XXV p. 725
——— 1907
The Blending and Overlap of Instincts. Science Vol. XXV p. 781
——— 1908
The Relation of Instinct to Intelligence in Birds. Science N.S. 27 pp 847-850
——— 1910 (June, July, Aug.)
Instinct and Intelligence in Birds. Pop. Sci. Monthly pp. 532-558, 82-97, 122-141
——— Sept. 1910
Life and Behavior of the Cuckoo. Jour. Exp. Zoölogy IX no. 1 pp. 171-233
——— 1911
Nests and Nest-building in Birds. Jour. Animal Behavior Vol. 1 pp. 159-162, 244-277, 336-373
——— no date
Instinct. Western Reserve University Bull. XXII no. 6 pp. 41-49
HESS, I. E. Jan. 1910
One Hundred Breeding Birds of an Illinois Ten-Mile Radius. Auk XXVII no. 1, p. 26
HIGGINS, H. C. March 1894
The Magnolia Warbler. Nidiologist Vol. I no. 7, p. 106
HILL, W. E. Aug.-Sept. 1884
Birds of the "Panhandle" W.Va. Orn. and Ool. IX no. 8 p. 103; Orn. and Ool. IX no. 9 p. 115
HOFFMAN, W. J. Oct. 6, 1875
List of Birds Observed at Grand River Agency, Dakota Ter., from Oct.7, 1872, to June 7, 1873. Proc. Bost. Soc. Nat. Hist. XVIII p. 172

Holland, A. H. 1895
Field Notes on the Birds of the Estancia Sta. Elena, Argentine Republic, Ibis. 7th series Vol. I p. 215

Holland, H. H. Jan. 1917
Condor XIX pp. 23-24

Hollister, N. Oct. 1908
Birds of the Region about Needles, California. Auk XXV no. 4 p. 460

Holtz, L. 1870
Beschreibung südamerikanischer Vogel-Eier. Jour. f. Orn. XVIII, pp. 5-15

——— 1872
Ueber Molobrus-Eier, zu Cantagallo in Brasilien von Herrn C. Euler gesammelt. Jour. f. Orn. 1872 pp. 193-201

Horsbrugh, C. B. 1916
Ornithological Notes from Alix and Buffalo Lake Districts, Province of Alberta, Canada, 1914. Ibis 10th series Vol. IV p. 688

——— 1918
Further Notes on Birds Observed at Alix, Buffalo Lake, and Red Deer in the Province of Alberta, Canada, in 1915 and 1916. Ibis 10th series Vol. VI pp. 489, 493, 495

Howard, H. Eliot
Territory in Bird Life.

Howe, R. G., Jr. and Allen, G. M. 1901
The Birds of Massachusetts. p. 116

Howe, R. H. and Sturtevant, E. 1899
The Birds of Rhode Island. p. 67

Howell, A. B. April 1914
Cowbird Notes. Auk XXXI no. 2 pp. 250-251

Howell, A. H. 1906
Birds that Eat the Cotton Boll Weevil. Bull. 25 Biol. Surv. U. S. Dept. Agri. p. 12

Hoxie, W. Nov. 1884
Notes from Chester Co., Pa. Orn. and Ool. IX no. 11 p. 138

Hoy, P. R. Jan. 1885
Auk Vol II no. 1 pp. 102-103

Hoyle, C. E. June, 1889
Double Sets of Cliff Swallows' Eggs. Orn. and Ool. Vol. XIV no. 6 p. 89

Hudson, William Henry. 1870
Letter on the Ornithology of Buenos Ayres. Proc. Zoöl. Soc. London 1870 pp. 671-673; *ibid.* 1872, p. 809, 1874, p. 161

——— 1920
Birds of La Plata Vol. I pp. 69-115

Hull, A. F. Basset. 1909
The Birds of Lord Howe and Norfolk Islands. Proc. Linn. Soc. of New South Wales XXXIV p. 679

Hume, A. O. 1890
Nests and Eggs of Indian Birds Vol. II 2nd Ed. ed. by E. W. Oates. pp. 381-382, 384-385

Hussey, R. F. Oct. 1916
Notes on Some Spring Birds of La Plata Auk XXXIII no. 4 p. 399
Ingersoll, S. R. Feb. 1890
Orn. and Ool. XV no. 2 p. 31
Isley, D. Jan. 1912
A List of the Birds of Sedgwick Co., Kansas. Auk XXIX no. 1 p. 32
Ivy, R. H. 1901
Notes on the Nesting and Other Habits of Some South African Birds. Ibis 8th series Vol. I pp. 20, 21-22, 24-25, 26
Jackson, T. H. Nov. 1868
The Cow-bunting. Amer. Naturalist Vol. II no. 9 p. 490
——— Nov. 1885
Nesting of the Worm-eating Warbler in Chester Co., Pa. Orn. and Ool. X no. 11 p. 176
Jacobs, J. Warren Jan. 1899
Nesting of the Black and White Warbler. Osprey III p. 71
——— 1903
The Yellow-throated Vireo. Wilson Bull. X p. 19
——— March 1, 1923
Cowbird (*Molothrus ater ater*) Lays Eggs Direct from Oviduct into the Nests of its Victims. Oologists Record III no. 1 pp. 19-20
——— 1924
The Other Egg in the Nest. Oologist, May 1924 pp. 52-54
James, Edwin (P.?) [Compiler]. 1823
Account of an Expedition from Pittsburgh to the Rocky Mountains performed in the years 1819 and 1820 by order of The Hon. J. C. Calhoun, Sec'y of War: under the command of Major Stephen H.(arriman) Long. Phila. 2 vols. Vol. II p. 199 footnote.
Jardine, W. 1840
On the History and Habits of Crotophaga. Ann. and Mag. Nat. Hist. IV pp. 160, 318
Jenner, Edward 1788
Observations on the Natural History of the Cuckoo; in a letter to John Hunter, Esq. Philos. Trans. Vol. 78 pt. 2 pp. 219-237
Jensen, J. K. July 1918
Notes on the Nesting Birds of Wahpeton, N. Dakota. Auk XXXV no. 3 pp. 346, 347, 348, 349
——— July 1923
Notes on the Nesting Birds of Northern Santa Fe County, New Mexico. Auk XL no. 3 p. 461
Jewet, S. G. Jan. 1909
Some Birds of Baker Co., Oregon. Auk XXVI no. 1 p. 7
Job, H. K. April 1899
Some Observations on the Anatidæ of North Dakota. Auk XVI no. 2 p. 165
——— 1902
Among the Wild Fowl. pp. 187, 196, 201, 204, 205
——— 1908
The Sport of Bird Study. pp. 170, 204, 226, 62-63

Jones, C. M. Feb. 1887
Nesting of the Blue-headed Vireo. Orn. and Ool. XII no. 2 p. 26
Jones, Lynds Sept. 1888
Nesting of the Golden-crowned Thrush. Orn. and Ool. Vol. XIII no. 9 p. 133
Jones, Lynds July 30, 1897
The Oberlin Grackle Roost. Wilson Bull. N. S. Vol. IV no. 4 pp. 37-56
Judd, W. W. 1907
The Birds of Albany County, N.Y., pp. 97-98
Keller, C. L. Dec. 1890
Orn. and Ool. XV no. 12 p. 184
Kellogg, C. D. 1900
Cowbird in a Dove's Nest. Bird Lore II p. 121
Kellogg, V. L. 1896
New Mallophaga II, from Land Birds, Together with an Account of Mallophagous Mouth Parts. Contrib. to Biology from the Hopkins Seaside Lab. VII Leland Stanford Jr. Univ. Publications pp. 478-480
Kells, W. L. 1885
Foster-Parents of the Cowbird. Auk Vol. II no. 1 p. 106
Kells, W. L. May 1887
Nesting of the Black-thr. Blue Warbler. Orn. and Ool. XII no. 5 pp. 76-77
——— Feb. 1897
Osprey. Vol. I p. 82
——— 1902-1903
Nesting of Some Canadian Warblers. Ottawa Nat. XVII no. 9 Dec. 1902 p. 182. Ottawa Nat. XVII no. 10. Jan. 1903 pp. 225-228, 230
Keyes, C. R. and Williams, H. S. 1889
Preliminary Catalogue of the Birds of Iowa. Proc. Davenport Acad. of Nat. Sciences, Vol. V pp. 136-137
Kibbe, A. E. July 1893
Nesting of the Hooded Warbler Orn. and Ool. XVIII no. 7 pp. 99-100
Kirkland, A. H. July 1896
The Army-Worm. Mass. Crop. Report p. 35
Kirkwood, F. C. 1895
A List of the Birds of Maryland. Reprint from Trans. Maryland Acad. of Sciences. 1895 pp. 322, 321
Kirn, A. J. 1918
Observations of Swainson's Warbler. The Oologist XXXV pp. 97-98
Knight, Chas. 1867
Natural History Vol. III Second Division of "The English Cyclopedia" p. 875
Knight, O. W. 1906
Notes on the Yellow-Palm Warbler. Warbler II, no. 1 (2nd series) p. 6
——— 1908
The Birds of Maine pp. 341, 342
Kohler, L. S. 1910
Preliminary List of Birds of Essex Co., N.J. Wilson Bull. XXII pp. 191-193
Kohler, L. S. 1913
Prelim. List of Birds of Northern Passaic Co., N.J. Wilson Bull. XX pp. 78, 81

Kumlein, L. and Hollister, N. 1903
The Birds of Wisconsin, Bull. Wis. Nat. Hist. Soc. Vol. III m.s. nos. 1, 2, 3. pp. 105, 124, 87

Kuschel, M. 1897
Über die Fortpflanzung von Cassidix oryzivora. Jour. f. Orn. XLV, pp. 168-170

La Jeunesse, H. V. Jan. 1923
Dwarf Cowbird Nesting in Alameda County, California. Condor XXV no. 1 pp. 31-32

Ladd, S. B. July 1887
Nesting of the Worm-eating Warbler. Orn. and Ool. XII no. 7 p. 110

——— Sept. 1887
A Series of Eggs of the Worm-eating Warbler. Orn. and Ool. XII no. 9 pp. 149-150

Langevin, E. 1918
The Prairie Hen. Oologist XXV p. 156

Langille, J. H. 1892
Our Birds in Their Haunts pp. 162, 164

Lantz, D. E. Dec. 1883
Bells Vireo. Orn. and Ool. VIII no. 12 p. 95

L(antz), D. E. Feb. 1885
The Kentucky Warbler. Orn. and Ool. Vol. 10, no. 2 pp. 19-20

——— Feb. 1885
Notes from Manhattan, Kan. Orn. and Ool. Vol. X no. 2 p. 29

Law, J. E. Sept. 1910
Cowbird Again Noted in Los Angeles Co. Condor XII p. 174

Lawrence, G. N. 1874
The Birds of Western and Northwestern Mexico, Based Upon Collections made by Col. A. J. Grayson, Capt. J. Xantus and Ferd. Bischoff, now in the Museum of the Smithsonian Institution at Washington, D.C. Memoirs Bost. Soc. Nat. Hist. II p. 281

Leotaud, A. 1866
Oiseaux de L'Ile de la Trinidad pp. 277-279

Leverkuhn, Paul 1891
Fremde Eier im Nest, Ein Beitrag zur Biologie der Vogel. Nebst euer Bibliographischen Notiz über Lottinger pp. 1, 2, 3, 4

Lewis, Meriwether, and Clark, William. 1905
Original Journals of the Lewis and Clark Expedition, 1804-1806. Edited by Reuben Goldthwaites, vol. 5, p. 201.

Lincoln, F. C. Jan. 1920
Birds of the Clear Creek District, Colorado, Auk XXXVII p. 69

Link, Johann Andreas. 1903
Proc. Ornithological Society of Bavaria Vol. IV n.s. Vol. I 60 pages

Lloyd, W. Oct. 1887
Birds of Tom Greene and Concho Co., Texas. Auk IV no. 3 p. 290

Loeb, Jacques 1918
Forced Movements, Tropisms, and Animal Conduct. Monographs on Experimental Biology I Chap. XVIII pp. 156-164

Loring, A. June 1890
Notes on the Birds of Tioga Co., N. Y. Orn. and Ool. XV no. 6 p. 83
Lottinger, A. J. 1775
Le Coucou, discours apologetique on memoire sur le Coucou. Nancy 8; 78 pages
——— 1776
Der Kukuk oder auf eigene Erfahrungen gegrundete Nachrichten uber die Naturgeschichte dieses wunderbaren Vogels. A. d. Frozos (Nancy 1775) übersetzt von (Herrmann) Strassbourg 8 30 SS
——— 1795
Histoire du Concou d'Europe; ouvrage divise en trois parties dont la premiere renferme l'historique du Concou, la seconde, les experiences, on les observations de l'auteur, la troisieme un supplement on des notes critiques. Strassbourg 8 36 pp.
Loucks, W. E. Sept. 1892
Past Reminiscences. Oologist IX no. 9 p. 217
——— Aug. 1893
Distribution of the Yellow-headed Blackbird in Illinois. Orn. and Ool. XVIII no. 8 p. 109
——— 1894
Life Hist. & Distr. of Prothonotary Warbler in Illinois. Bull. Ill. State Lab. of Nat. Hist. IV pp. 31-32
Lowe, P. R. 1909
Notes on Some Birds collected during a Cruise in the Caribbean Sea. Ibis 9th series Vol. III p. 312
Lowe, W. P. Oct. 1917
Remarks on Colorado Birds. Auk XXXIV no. 4 p. 455
Lumsford, I. C. 1918
Notes. Oologist XXXV p. 140
Lydekker, R. 1904
Library of Natural History III p. 1531
Mabbott, D. C. Nov. 15, 1912
, A Careless Cowbird. Oologist XXIX no. II p. 384
Macfarlane, R. R. 1888-1889
Land & Sea Birds nesting within the Artic Circle in the Lower Mackenzie River District. Trans. Historical and Scientific Soc. of Manitoba XXXIX 1888-1889 p. 6
Mackay, G. H. Jan. 1895
Terns of Muskeget Island. Auk III no. 1 p. 41
Macoun, J. & J. M. 1909
Catalogue of Canadian Birds pp. 425-426, 614
Mailliard, J. Nov. 1914
New Breeding Records for California. Condor XVI p. 261
Marceau, E. Sept. 1891
Unusual Occurrences. Oologist VIII no. 9 p. 180
Maris, W. L. July 1891
The Rose-br. Grosbeak in Washtenaw County, Mich. Orn. & Ool. XVI no. 7 p. 106

McAtee, W. L. 1904
Ecological Notes on the Birds Occurring within a Radius of 5 miles of the Indiana University Campus. Proc. Indiana Acad. Sci. p. 101
——— Jan. 1911
Bird Enemies of the Texas-fever Tick and other Ticks. Auk XXVIII no. 1. p. 137
——— May 1911
Remarks on the Food of young Cowbirds. Condor XIII p. 107
McIlwraith, 1894
The Birds of Ontario p. 280, 282
McLeod, J. R. June 15, 1914
Cowbird's Eggs. Oologist XXXI no. 6 p. 128
Mearns, E. A. 1878
A List of the Birds of the Hudson Highlands. Bull. Essex Institute Vol. XII p. 23
Meikeljohn, R. F. April 1917
Some Reflections on the Breeding-Habits of the Cuckoo (Cuculus canorus). Ibis 10th series Vol. V no. 2 pp. 186-223
Mercer, W. T. Apr. 1911
Oologist XXVIII no. 4 p. 77
Merriam, C. H. 1885
Nest & Eggs of the Blackburnian Warbler Auk II p. 103
——— 1890
Birds Which Feed on Mulberries U.S. Dept. of Agr. Report 1890, p. 285
Merrill, J. C. Oct. 1877
Notes on Molothrus aeneus. Bull. N. O. C. II no. 4. pp. 85-87
Miller, Leo. 1917 Field Notes on Molothrus. Bull A.M.N.H. 1917, p. 579-92.
Miller, R. F. 1914
Data on 55 nests containing Cowbirds' eggs. Oologist XXXI pp. 67-71
——— Sept. 15, 1914
Oologist XXXI no. 9 p. 176
——— Dec. 15, 1914
A Field Sparrow's Egg in Maryland Yellowthroat's Nest. Oologist XXXI no. 12 p. 224
Minot, H. D. 1876
The Land Birds & Game Birds of New England 3rd Ed. Ed. by Wm. Brewster 1903 p. 255
——— 1880
Notes on Colorado Birds. Bull. Nuttal Orn. Club V p. 230
Mitchell, P. Chalmers 1911
On Longevity and Relative Viability in Mammals and Birds; with a Note on the Theory of Longevity, P. Z. S. 1911 pp. 480-481, 485
Mitchell, W. I. Oct. 1898
The Summer Birds of San Miguel County, New Mexico. Auk XV p. 309
Moesel, J. 1916
A Domestic Tragedy. Bird Lore XVIII pp. 160-163

MONTGOMERY, T. H., JR. July 1897

A List of the Birds of West Chester Co., Pa. Amer. Nat. XXXI p. 626

MORDEN, J. A. April 1884

Cowbirds in a Black and White Creeper's Nest. Auk Vol. I no. 2 pp. 193-194

MORGAN, C. LLOYD 1900

Animal Behavior pp. 90-92

MORRISON, C. T. Oct. 1884

Yellow Warbler vs. Cowbird. Orn. & Ool. IX no. 10 p. 124

MOURITZ, L. B. April 1915

Notes on the Ornithology of the Matopo District, Southern Rhodesia. Ibis. 10th series, Vol. III no. 2 p. 210

MOUSLEY, H. April 1916

Five Years Personal Notes and Observations on the Birds of Hatley, Stanstead Co., Quebec 1911-1915. Auk XXXIII no. 2 p. 168

——— July 1918

Further Notes and Observations on the Birds of Hatley, Stanstead Co., Quebec, 1916-1917. Auk XXXV no. 3 p. 291

MULLER, ADOLF 1889

On an Instance of a Cuckoo Hatching its own Eggs. Ibis 6th series Vol. I pp. 219-224

MULLIKEN, W. E. Apr. 1899

A Peculiar Set of Eggs of the Scarlet Tanager. Bull. Mich. Orn. Club III no. 2 p. 18

MUNDT, A. H. Feb. 1883

Oological and Ornithological. Orn. and Ool. Vol. VIII no. 2 p. 9

MURRAY, AMELIA MATILDA 1856

Letters from the United States, Cuba, and Canada. N. Y., G. P. Putnam pp. 347-348

MURRAY, CHARLES AUGUSTUS 1839

Travels in North America during the years 1834, 1835, and 1836 Vol. I p. 189 footnote

NAUMBURG, ELSIE M. B. & FRIEDMANN, HERBERT 1927.

A New Race of Molothrus bonariensis from Brazil. Auk, October 1927, p. 494.

NEHRKORN, A. 1881

Beschreibung yucatanischer Eier. Journ. f. Orn. XXIX p. 68

——— 1899

Katalog der Eiersammlung., Braunschweig.

NEHRLING, H. 1883

Beiträge zur Ornis des nördlichen Illinois. Journ. f. Orn. XXXI pp. 83-84

——— 1896

Our Native Birds of Song & Beauty Vol. II pp. 241, 244-245, 271

NICE, MRS. MARGARET M. 1921

A White Cowbird Wilson Bull. XXXIII no. 5 pp. 145-146

——— Oct. 1922

A Study of the Nesting of Mourning Doves Auk XXXIX no. 4

NORRIS, J. P. Sept. 1886

Large Sets of Eggs. Orn. and Ool. XI no. 9 p. 135

Norris, J. P. Dec. 1888
Seven Eggs of the Willet Laid in One Nest. Orn. and Ool. XIII no. 12 p. 189

——— Mar. 1889
Orn. & Ool. XIV no. 3 p. 39

——— Sept. 1889
Orn. & Ool. XIV no. 9 p. 138

——— Feb. 1890
A Series of Eggs of the Nashville Warbler. Orn. and Ool. XV no. 2 p. 24

———Aug. 1890
A Series of Eggs of the Worm-eating Warbler. Orn. and Ool. XV no. 8 pp. 119-120

——— Dec. 1890
A Series of Eggs of the Prothonotary Warbler. Orn. and Ool. XV no. 12 pp. 177-182

——— April 1891
Variation in the Size of Cowbirds' Eggs. Orn. and Ool. XVI no. 4 p. 61

N(orris), J. P. Oct. 1891
A Series of Eggs of the Maryland Yellowthroat. Orn. and Ool. XVI no. 10 pp. 150-152

——— Jan. 1892
A Series of Eggs of the Kentucky Warbler. Orn. and Ool. XVII no. 1 pp. 1-3

Norris, J. P. Feb. 1892
A Series of Eggs of the Scarlet Tanager. Orn. and Ool. XVII no. 2 pp. 21-22

——— May 1892
A Series of Eggs of the Ovenbird. Orn. and Ool. XVIII no. 5 pp. 65-67

Norris, J. P. Jr. Dec. 1888
Nesting of the White-eyed Vireo in Chester Co. Pa. Orn. and Ool. XIII no. 12 pp. 186-187

——— July 1889
Nesting of the Kentucky Warbler in Chester Co., Pa. Orn. and Ool. no. 7 pp. 104-106

——— Aug. 1890
Nesting of the Golden-crowned Thrush in Center Co., Pa. Orn. and Ool. XV no. 8 p. 126

——— Oct. 1890
Nesting of the Kentucky Warbler in Chester and Delaware Counties. Pa. Orn. and Ool. XV no. 10 pp. 145-146

North, A. J. 1892-96
Supplement to the Descriptive Cat. of "Nests & Eggs of Birds found Breeding in Australia & Tasmania" Records of the Australian Museum II p. 16

——— 1896
On the Habits of a Cuckoo in the Gilbert Islands P.Z.S. pp. 934-935

Nuttall, Thomas 1840
A Popular Handbook of the Birds of the U. S. and Canada. New and Revised Ed. ed. by Montague Chamberlain. Revised Ed. 1903 pp. 104, 105

Oates, E. W. 1889

On the European Cuckoo and its Indian Allies. Ibis 6th series Vol. I p. 355

Oates, E. W. and Reid, S. G. 1903

Catalog Birds' Eggs in Brit. Mus. III pp. 104-105, 116, 118, 119, 316

Oberholser, H. C. 1896

A Preliminary List of the Birds of Wayne County, Ohio Bull. Ohio Agri. Exp. Station Technical Series Vol. I no. 4 pp. 301-302

——— 1920

The Migration of North American Birds Second Series XIV Cowbirds. Bird Lore Vol. XXII pp. 343-345

Ogilvie-Grant, W. R. 1912

Brit. Mus. Cat. Birds' Eggs Vol. V p. 374

O'Neal, R. J. 1909

Word for the Cowbird. Bird Lore XI pp. 214-215

Ord, George 1815

North American Zoology. Guthrie's Geography 2nd Amer. Edition (see under Rhoads, S. N. 1894)

——— Feb. 1836

Observations on the Cow Bunting of the United States of America. Magazine of Nat. Hist. (J. C. London Ed.) pp. 58, 65, 65-71

Otto, M. C. 1919

Bird Lore XXI pp. 179-180

Page, W. T. 1905

The Silky Cowbird. Avic. Mag. pp. 137-141

Parker, H. G. Feb. 1886

A Day in Chatville. Orn. and Ool. XI no. 2 p. 23

——— May 1887

Notes on the Eggs of the Thrushes and Thrashers. Orn. and Ool. XII no. 5 p. 69

Parshall, S. E. Nov. 1884

The Cowbird Nuisance. Orn. and Ool. IX no. 11 pp. 138, 139

Payne, E. B. Dec. 1897

Osprey II p. 55

Peabody, P. B. Mar. 1893

Chat and Cliff Swallow. Oologist X no. 3 pp. 71-72

——— Apr. 1899

The Prairie Horned Lark. Osprey III p. 118

——— Apr. 1901

Nesting Habits of Leconte's Sparrow. Auk XVIII pp. 131, 132

——— 1909

Cyanocephalus the Obscure. Warbler V p. 16

Peabody, W. B. O. 1838

A Report on the Ornithology of Mass. (In Reports of the Commissioners of the Zoological Survey of the State) pp. 283-284

Pearl, R. 1912

The Mode of Inheritance of Fecundity in the Domestic Fowl. Jour. Exp. Zool. Vol. XIII, pp. 153-268

——— 1914
Studies on the Physiology of Reproduction in the Domestic Fowl VII. Data regarding the Brooding Instinct in Its Relation to Egg Production. Jour. Animal Behavior IV pp. 266-289

Pearl, R., and Schoppe, W. F. 1921
Studies on the Physiology of Reproduction in the Domestic Fowl XVIII Further Observations on the Anatomical Basis of Fecundity. Jour. Exp. Zoology vol. 34 no. 1 pp. 101-118

Pearson, T. G. 1915
Towhee: Audubon Educational Leaflet 79

Penard, F. P. & A. P. 1910
Die Vogels van Guyana II pp. 366-368

Pennant, T. 1785
Arctic Zoology. Vol. II p. 259

Pennock, C. J. 1907
Bird Life of Indian River County of Delaware. Cassinia No. XI p. 30

Perry, G. P. 1908
Nest of Wood Thrush into which a Cowbird had Deposited Five Eggs. Bird Lore X pp. 126-127

Plank, W. 1919
Cowbird Impositions. Oologist XXXVI p. 18

Pohling, O. C. Sept. 9, 1889
Ornithologist and Oologist XIV no. 9 pp. 133-134

——— June 1890
Further Notes on the Cowbird with Remarks on the Nesting of the Prothonotary Warbler at Quincy, Ill. Orn. & Ool. XV no. 6 p. 92

Porter, James P. 1906
Further Study of the English Sparrow and Other Birds. Amer. Journ. Psychology, xvii, pp. 248-271

——— 1910
Intelligence and Imitation in Birds: A Criterion of Imitation. Amer. Journ. Psychology, xxi, pp. 1-71

Porter, L. H. Jan. 1908
Nesting Habits of Birds at Stamford, Conn. as affected by the Cold Spring of 1907. Auk XXV no. 1 p. 18

Pratt, W. C. May 1890
Notes from Lake Forest, Ill. Orn. & Ool. XV no. 5 p. 70

Preble, E. A. 1908
A Biological Investigation of the Athabasca-Mackenzie Region. N. Amer. Fauna 27 p. 407

Preen, V. 1861
Aufforderung zu vergleichened Versuchen uber die Fortpflanzungsgeschicte des Kuckuks. Meklenbgr. Archiv. XV p. 33

Preston, J. W. Mar. 1889
The Blackburnian Warbler at Home. Orn. & Ool. Vol. XIV no. 3 p. 35

Prior, C. E. Sept. 1884
The Black and White Creeper. Orn. & Ool. IX no. 9 p. 109

Pycraft, W. P. 1910
A History of Birds pp. 127-134

Quillin, Roy W. and Holleman, Ridley Jan. 1918
The Breeding Birds of Bexar Co., Texas. Condor XX p. 41

Rader, S. Dec. 1884
Curious Nesting. Orn. and Ool. IX no. 12 p. 151

Rahmer, C. F. 1912
Observaciones sobre el Molothrus bonariensis Gm. Santiago de Chile Bol. Mus. Nac. Vol. IV pp. 207-209

Raine, Walter Jan.-Apr. 1894
Bird Nesting in Northwest Canada. Nidiologist Vol. I no. 5 p. 71; no. 8 p. 120

Ransom, B. H. 1909
The Tænioid Cestodes of North American Birds. U. S. N. M. Bull. 69 p. 115

Rawson, C. L.—see W., J. M.

Read, M. C. Sept. 1853
Catalogue of the Birds of Northern Ohio. Proc. Acad. of Nat. Sciences of Phila. p. 397

Reed, C. A. July 1902
American Ornithology II no. 7 pp. 201, 202

——— 1911
Camera Studies of Wild Birds in Their Homes pp. 177-185, 201, 221, 209

Reed, Carlos S. 1913
Revista Chilena de Historia Natural, XVII no. 3

Reed, C. K. Sept. 1891
Orn. & Ool. XVI no. 9 p. 144

Reed, Hugh Daniel and Wright, Albert Hazen 1909
Vertebrates of the Cayuga Lake Basin, Proc. Amer. Philos. Soc. XLVIII no. 193 p. 433

Reiff, I. S. July 1888
Birds found Nesting in Bucks Co., Pa., May 13, 1888. Orn. and Ool. XIII no. 7 p. 99

——— Jan. 1893
A Few Days Among the Blue-Winged Warblers. Orn. and Ool. XVIII no. 1 pp. 6-8

Reinecke, Ottomar No date
Personal Observations and Notes on Breeding, Migrant, or Visiting Birds on the Niagara Frontier p. 536

Ressel, C. B. July 1889
Birds of Chester Co., Pa. Orn. and Ool. XIV no. 7 p. 101

Rey, E. 1895
Beobachtungen uber den Kukuk bei Leipzig aus dem Jahre 1894 Jour. fur Ornithologie XLIII pp. 30-43

——— 1895
Der Muller'sche Kukuk brutet immer noch. Orn. Monber. III pp. 8-10

——— 1895
Vas ist der Grund für die grosse Variabilität der Kukukeier. Monatsschr. Ver. Schutz Vogelw. pp. 1-3

Rhoads, S. N. 1894
A Reprint of the North American Zoology by George Ord, being an exact reproduction of the part first published in the 2nd American edition of Guthrie's Geography in 1815 p. 316

Rich, G. C. Feb. 1882
Notes from Saratoga. Orn. and Ool. Vol. VI no. 12 p. 91

Richmond, C. W. Jan. 1888
An Annotated List of Birds Breeding in the District of Columbia. Auk V no. 1 pp. 21-22

Riddle, Oscar Oct. 1916
Size and Length Relations of the Right and Left Testes of Pigeons in Health and Disease. Anatomical Record Vol. II pp. 87-103

Riddle, Oscar Oct. 1917
The Control of Sex Ratio. Washington, J. Acad. Science VII pp. 319-356

——— 1918
Further Observations on the Relative Size and Form of the Right and Left Testes of Pigeons in Health and Disease and as Influenced by Hybridity. The Anatomical Record XIV pp. 283-334. Summary pp. 333-334

Ridgway, Robert 1887
U. S. Geological Exploration of the 40th Parallel Vol. IV part 3 Ornithology p. 501

——— 1902
The Birds of North & Middle America Part 2 Bull. 50 U.S.N.M. pp. 202, 204-206, 208, 210, 212

——— 1915
Bird Life in Illinois Bird Lore XVII p. 99

Roberts, Austin 1907
Journ. S. Afr. Orn. Union II p. 9

——— July 1913
Egg-collecting in the Bushveld. Jour. S. Af. O. U. IX pp. 34-35, 36-37

——— May 16, 1917
Parasitism amongst Finches. Annals of the Transvaal Museum V part 4 pp. 259-261-262

Roberts, T. S., and Benner, Franklin 1880
A Contribution to the Ornithology of Minnesota. Bull. N.O.C. V p. 15

Roberts, T. S. Oct. 1909
A Study of a Breeding Colony of Yellow-headed Blackbirds; Including an Account of the Destruction of the Entire Progeny of the Colony by Some Unknown Natural Agency. Auk XXVI no. 4. pp. 371-389

Rockwell, R. B. July 1908
An Annotated List of the Birds of Mesa Co., Colorado. Condor X no. 4 p. 169

——— May 1909
The Use of Magpie's Nests by Other Birds. Condor XI p. 92

Rodney, H. S. Dec. 1869
The Cow Bunting. Amer. Nat. Vol. III no. 10 p. 550

Romanes, G. J. 1883
Animal Intelligence pp. 301-310

Rowan, William 1922
Some Bird Notes from Indian Bay, Manitoba. Auk XXXIX p. 229
Rust, H. J. Mar.-Apr. 1917
An Annotated List of the Birds of Fremont Co., Idaho, as observed during the Summer of 1916. Condor XIX no. 2 pp. 37-39
Sage, J. H. and Bishop, L. B. 1913
The Birds of Connecticut. Conn. State Geological and Nat. Hist. Survey Bull. 20 pp. 110-11, 146, 159, 160
Salvin, O., and Godman, F. DuCane 1886
Biologia Centrali Americana Aves I p. 451
Samuels, E. A. 1867
Ornithology and Oology of New England. pp. 339-341
Sanborn, C. C., and Goelitz, W. A. 1915
A Two Year Nestling Record in Lake Co., Ill. Wilson Bull. XXVII no. 4 pp. 445-448
Saunders, Aretas A. Jan. 1911
Birds of Gallatin Co., Montana Auk XXVIII no. 1 p. 40
——— May 1914
Birds of Teton and Northern Lewis and Clark Counties, Montana. Condor XVI no. 3 pp. 136, 143
——— 1914
An Ecological Study of the Breeding Birds of an Area near Choteau, Montana Auk XXXI pp. 204-207
Saunders, W. E. Sept. 1884
Nest of Chewink. Orn. and Ool. IX no. 9 p. 115
——— Oct. 1900
Nesting Habits of the Cerulean Warbler. Auk XVII p. 361
Savage, D. L. Dec. 1893
Notes on the Birds of Henry Co., Iowa. Oologist X no. 12 pp. 325, 326
——— June 1894
Vireonidæ in Iowa. Oologist XI no. 6 p. 215
Schlegel, M. June 1916
Ingenious Disposal of Cowbird's Eggs. Country Life in Amer. pp. 74-76
Sclater, W. L. 1912
History of the Birds of Colorado pp. 303, 401, 405
Sclater, Philip, Lutley, and Hudson, William Henry. 1888
Argentine Ornithology I pp. 72, 86, 95
Scott, W. E. D. April 1885
On the Breeding Habits of Some Arizona Birds. Second Paper; Icterus cucullatus. Auk II no. 2 p. 163
——— Jan. 1887
On the Avafauna of Pinal Co., with Remarks on Some Birds of Puna & Gila Co., Arizona Auk IV no. 1 p. 22
——— 1898
Bird Studies p. 253
——— April 1904
An Account of Rearing Wild Finches by Foster-Parent birds. Science, N.S. XIX no. 483 pp. 551-554

SETON, E. T. 1911
The Arctic Prairies p. 387
SHARPE, RICHARD BOWDLER 1898
Wonders of the Bird World. Chap. xi, pp. 295-323
SHAVER, NELLE E. Dec. 1918
A Nest Study of the Maryland Yellow-throat. University of Iowa Studies in Natural History Vol. VIII no. 2
SHELFORD, VICTOR E. 1913
Animal Communities in Temperate America. As Illustrated in the Chicago Region. A Study in Animal Ecology. Univ. of Chicago Press. pp. 274, 275, 290
SHEPARDSON, D. I. Mar. 1915
The House Finch as a Parasite. Condor XVII pp. 100-101
SHERMAN, A. R. July 1913
The Nest Life of the Sparrow Hawk. Auk XXX p. 413
SHORT, E. H. Sept. 1892
The Breeding Warblers of Western New York. Oologist IX no. 9 pp. 209-210
——— Aug. 1894
The First Day of June 1894. Oologist XI no. 8 pp. 255-256
——— 1896
Birds of Western New York p. 14
SHRINER, C. A. 1896
The Birds of New Jersey p. 44
SHUFELDT, R. W. April 1881
Notes on a Few of the Diseases and Injuries in Birds. Amer. Nat. XV no. 4 p. 283
——— April 1888
On the Skeleton in the genus Sturnella, with Osteological Notes upon other North American Icteridæ, and the Corvidæ. Jour. of Anat. and Physiol. Vol. XXII (N.S. vol. II) pp. 309-350
——— Oct. 1888
Correspondence Auk V no. 4 p. 441
——— 1907
Polygamy & other Modes of Mating Among Birds. Amer. Nat. XLI pp. 172-173
SILLOWAY, P. M. 1917
Some Nesting Birds of the Judith Basin, Montana, no. 4. Oologist XXXIV pp. 158-9, 45
SIMMONS, GEORGE FINLAY July 1915
On the Nesting of Certain Birds in Texas. Auk XXXII no. 3 pp. 329, 331
——— 1925
Birds of the Austin Region. pp. 171-172
SIMPSON, R. B. Dec. 15, 1914
The Solitary Vireo. Oologist XXXI no. 12 p. 230
SITGREAVES, CAPTAIN L. 1853
Report of an Expedition down the Zuni and Colorado Rivers p. 80
SKINNER, KENNETH L. March 1923
Notes on Some Eggs from Brazil. The Oologist's Record III no. 1 p. 21

SMALL, E. A. Dec. 1882

Cow Birds. Orn. & Ool. VII no. 23 p. 182

SMITH, AUSTIN PAUL 1910

Miscellaneous Bird Notes from the Lower Rio Grande Condor XII 1910 pp. 97-98

SMITH, A. P. April 1912

Strange Actions of a Red-eyed Cowbird Auk XXIX no. 2 p. 244

SMITH, P. JR Dec. 1882

Eggs in a Set. Orn. and Ool. Vol. VII no. 23 p. 182

SMITH, P. W. JR. Feb. 1886

Large Sets of Eggs of the Mourning Dove. Orn. & Ool. XI no. 2 p. 28

SMITH, W. F. Oct. 1909

Tame Cowbird. St. Nicholas XXXVI Oct. 1909 p. 1134

——— July-Aug. 1921

The Yellow-breasted Chat and the Cowbird. Bird Lore XXIII no. 4 pp. 175-177

SMITHWICK, J. W. P. Aug. 1891

A Curious Find. Oologist VIII no. 8 p. 160

SNODGRASS, R. E. April 1904

A List of Land Birds from Central and Southeastern Washington. Auk XXI no. 2 p. 229

SPARRMAN, A. 1777

The History of the Honey-Guide. Philos. Transact. LXVII p. 43

SPICER, S. Mar. 1887

Nesting under Difficulty. Orn. and Ool. XII no. 3 p. 38

STANSELL, S. S. S. May-June 1907

Some Edmonton, Alberta, Birds. Bird Lore no. 3 p. 120

——— Oct. 1909

Birds of Central Alberta. Auk XXVI no. 4 p. 396

STEARNS, W. A., AND COUES E. 1881

New England Bird Life, Part I p. 296

STEJNEGER, L. 1885

Birds, being Vol. IV of the Standard Nat. Hist. p. 545

STERNBERG, CHRYSANTHUS 1869

Zur Fortpflanzungsgeschichte des Viehstaares, Molothrus sericeus. Jour. für Ornithologie Vol. XVII pp. 125-136

STONE, WITMER 1891

A Revision of the Species of Molothrus Allied to M. bonariensis (Gm.). Auk 1891 pp. 344-347

——— 1894

Summer Birds of the Pine Barrens of New Jersey. Auk XI p. 138

——— 1896

The Molting of Birds with Special Reference to the Plumages of the Small Land Birds of Eastern N. Amer. Proc. Phila. Acs. Nat. Sci. Vol. XLVIII pp. 116, 134

——— 1908

Birds of New Jersey. Report of the N. J. State Mus. p. 319

——— July 1913
Bird Migration Records of William Bartram. Auk XXX no. 3 p. 344

——— 1916
Report on Spring Migration for 1916. Cassinia Vol. XVI p. 35

Stoner, E. A. 1919
Cowbird in Iowa. Oologist XXVI pp. 80-81

Strecker, J. K., Jr. Nov. 1893
Nesting of the Painted Bunting. Nidiologist Vol. I no. 3 p. 39

Strong, W. A. 1919
Curious Eggs. Oologist XXXVI, p. 181

Strumberg, C. W. Jan. 1883
Notes from Galesburg, Ill. Orn. and Ool. Vol. VIII no. 1 p. 8

Stubbs, A. P. April 1916
Cowbird Wintering in Massachusetts. Auk XXXIII no. 2 pp. 201-202

Studer, J. H. 1895
The Birds of North America p. 78

Stzolcman, Jan. 1926
Ptaki zebrane w. Paranie. Etude des collections ornithologiques de Paraná Prace Zoologiczne Polskiego Panstwowego Muzeum Przyrodniczego Annales zoologici Musei Polonici Historiæ Naturalis. tom. v., pp. 194-195

Swainson, Wm., and Richardson, John 1831
Fauna Boreali-Americana Part Second The Birds p. 277

Swales, B. H. Oct. 1891
Nesting Notes 1890. Orn. and Ool. XVI no. 10 p. 148

——— Feb. 1892
Michigan Bird Notes 1891. Oologist IX no. 2 p. 45

——— May 1892
Rose-br. Grosbeak in Wayne Co., Mich. Orn. & Ool. XVII no. 5 p. 75

——— July 1893
Detroit, Mich. 1891 Notes. Orn. and Ool. XVIII no. 7 pp. 100-101

——— July-Dec. 1897
A Trip to Grassy Island. Bull. Mich. Orn. Club Vol. I no. 3-4, p. 32

Swarth, Harry S. May 1905
Summer Birds of the Papago Indian Reservation and of the Santa Rita Mts. Condor VII p. 79

Swynnerton, C. F. M. 1918
Rejections by Birds of Eggs unlike their own; with Remarks on some of the Cuckoo Problems. Ibis 10th series Vol. VI pp. 127-154

Taczanowski, Ladislas 1884
Ornithologie du Perou, ii, pp. 422-424

Taverner, P. A. 1918
Addenda to the Birds of Jasper Park, Alberta. Canadian Alpine Journal IX p. 66

Taylor, H. R. Sept. 1885
Californian Oological Notes. Orn. and Ool. Vol X no. 9 p. 142

Taylor, W. P. Feb. 1912
Field Notes on Amphibia, Reptiles and Birds of Northern Humboldt Co., Nevada. Univ. of Calif. Publications in Zoology Vol VII no. 10 p. 400

TERRIL, L. M. Nov. 1904
Summer Warblers in Compton County, Quebec. Ottawa Nat. XVIII no. 8 p. 152

THOMAS, C. S. June 1916
A Counterfeiter in Speckled Eggs. Country Life in Amer. pp. 72-74

THOMSON, J. ARTHUR 1919
Secrets of Animal Life Chap. VI pp. 39-46 Cuckoo Puzzles

——— 1923
The Biology of Birds pp. 309-310

THOREAU, H. D. 1884
Summer: From the Journal of H. D. Thoreau Ed. by H. D. O Blake p. 28

TODD, W. E. CLYDE April 1893
The Occurrence in Summer of Certain Warblers at Beaver, Pa. Auk X no. 2 p. 209

TODD, W. E. CLYDE AND CARRIKER, M. A. JR. 1922
The Birds of the Santa Marta Region of Colombia: A Study in Altitudinal Distribution. Annals Carnegie Museum XIV p. 476

TOWNSEND, CHARLES WENDEL 1905
The Birds of Essex County, Mass. Memoirs of the Nuttall Orn. Club III p. 244

——— Aug. 1920
Supplement to the Birds of Essex County, Mass. Memoirs of the Nuttall Ornithological Club no. V p. 129

TRIPPE, T. M. June 1868
The Warblers. Amer. Nat. II no. 4 pp. 171-172

——— Aug. 1869
The Cow Blackbird. Amer. Nat. Vol. III no. 6 pp. 291-294

TROSTLER, I. S. Oct. 1895
Among the Sandhills in N. W. Nebraska. Nidiologist III no. 2 p. 21

TULLSEN, H. May 1911
My Avian Visitors: Notes from South Dakota. Condor XIII p. 95

TURNBULL, W. P. 1869
Birds of Eastern Penn. and N. Jersey. p. 25

TYLER, W. M. Oct. 1920
The Cowbird's Whistle. Auk XXXVII no. 4 p. 584

VANTYNE, J. Jan. 1924
Notes on Michigan Birds. Auk XLI no. 1 p. 169

VISHER, S. S. July 1909
The Capture of the Red-eyed Cowbird in Arizona. Auk XXVI no. 3 p. 307

——— April 1910
A Correction: A New Bird for the United States. Auk XXVII no. 2 p. 210

VON IHERING, H. 1899
As Aves do Estado de San Paulo Revista Museu Paulista III

——— 1900
Catalogo critico-comparativo dos ninhos e evos das Aves do Brazil. Revista do Museu Paulista IV p. 200

——— H., and VON IHERING R. 1907
Aves do Brazil. p. 396

W., F. B. Feb. 1890
Orn. and Ool. XV no. 2 p. 31
W., J. M. (Rawson, C. L.) 1882
Chat's Nest. Orn. and Ool. VIII no. 2 p. 15
——— 1887
City Singers. Orn. and Ool. XII no. 3 p. 41
——— Jan. 1888
The Parula Warbler—Its Nest and Eggs. Orn. and Ool. XIII no. 1 p. 2
——— April 1891
The Birds of Long Point. Orn. and Ool. XVI no. 4 p. 60
Wallace, A. R. 1868
A Theory of Birds' Nests. Jour. of Travel and Nat. Hist. p. 73
——— 1895
The Philosophy of Birds' Nests. Natural Selection and Tropical Nature p. 104
Warren, B. H. 1890
Birds of Pennsylvania pp. 209-210
Warren, E. R. Jan. 1910
Some Central Colorado Bird Notes. Condor XII p. 36
Watkins, L. W. 1900
Michigan Birds that Nest in Open Meadows. 1st Report Mich. Acad. of Science p. 71
Watson, J. B. 1909
The Behaviour of Noddy and Sooty Terns. Pub. 103 Carnegie Institution of Washington, p. 223
Wayne, A. T. 1910
Birds of South Carolina. Contrib. from the Charleston Museum I p. 108
Weed, C. M., and Dearborn, N. 1903
Birds in their Relation to Man. pp. 162-163
Weeks, LeRoy Titus 1922
A Deceived Yellow Warbler. Auk XXXIX no. 2 p. 266
Wells, J. G. Oct. 1902
The Birds of the Island of Carriacou. Part II Land Birds. Auk XIX no. 4 p. 347
Wetmore, Alexander Mar. 1918
Birds Observed near Minco, Central Oklahoma. Wilson Bull. XXX no. 1 p. 9
——— April 1919
Notes on the Structure of the Palate in the Icteridæ. Auk XXXVI no. 2 pp. 190-197
——— July 1920
Birds of Lake Burford, N. Mex. Auk XXVII no. 3 pp. 402-403
——— Dec. 30, 1921
A Study of the Body Temperature of Birds Smithsonian Misc. Coll. Vol 72 no. 12 p. 41
——— 1926
Observations on the Birds of Argentina, Paraguay, Uruguay, and Chile. Bull. 133 U. S. Nat. Mus. pp. 383-388

Weygandt, C. 1905
Summer Birds of Broadhead's Creek, Monroe Co., Pa. Cassinia No. IX p. 6
——— 1910
The Wood Thrush. Cassinia No. XIV p. 24
——— 1914
Summer in the Poconos Cassinia no. XVIII p. 32
Wheelock, I. G. Jan. 1905
Regurgitative Feeding of Nestlings. Auk XXII no. 1 pp. 57, 63
White, E. W. 1882
Notes on Birds collected in the Argentine Republic With Notes by P. L. Sclater P.Z.S. p. 601
Whiteaves, Dr. J. F. 1902
Paleontology and Zoology in Summary Report on the Operations of the Geological Survey for the year 1901 Geological Survey of Canada Annual Report (new series) Vol. XIV Report A p. 259
Whitman, C. O. 1898
Animal Behavior—16th Lecture Biological Lectures from The Marine Biological Laboratory, Woods Hole, Mass. pp. 310-338
Widmann, Otto 1882
Cuckoos Laying in the Nests of Other Birds. Bull. N.O.C. VII pp. 56-57
——— July 1893
Orn. & Ool. XVIII no. 7 p. 101
——— July 1902
List of Birds Observed in the Neighborhood of Wequetonsing, Emmet Co., Mich. July 9 to July 23, 1901 Auk XIX no. 3 p. 234
——— Nov. 16, 1907
A Preliminary Catalogue of the Birds of Missouri. Trans. Acad. Sci. of St. Louis XVII no. 1 pp. 189-190, 151-152
Wilder, C. H. Dec. 1882
Swamp Sparrow (corrected to Song Sparrow in Orn. and Ool. Vol. 8 no. 9 Sept. 1883 p. 71) Orn. and Ool. Vol. 7 no. 23 p. 181
Willet, G. July 25, 1912
Birds of the Pacific Slope of Southern California. Pacific Coast Avifauna No. 7 p. 70
——— July 1915
Summer Birds of Forrester Island, Alaska. Auk XXXII no. 3 p. 298
Williams, C. B. 1922
Notes on the Food and Habits of some Trinidad Birds. Trinidad and Tobago Bulletin, XX, nos. 2, 3 and 4 p. 137
Williams, R. W., Jr.. Oct. 1904
A Preliminary List of the Birds of Leon Co., Fla. Auk XXI no. 4 p. 457
Wilmot, N. E. 1918
Records of Nests of the Season of 1917. Oologist XXXV p. 59
Wilson, Alexander 1810
American Ornithology Vol. 2 pp. 145-150, 158

WILSON, B. H. 1906
Birds of Scott Co., Iowa Wilson Bull. XVIII p. 5
WINTLE, E. D. 1896
The Birds of Montreal pp. 90-91
WITHINGTON, F. 1888
On the Birds of Lomas de Zamara, Buenos Aires, Argentine Republic. Ibis 5th series Vol. VI pp. 463, 465
WOLCOTT, R. H. Apr. 1899
Bull. Michigan Orn. Club III no. 2 p. 18
WOOD, A. A. Mar. 1920
An Annotated List of the Birds of Coldstream, Ontario, Vicinity. Canadian Field Naturalist XXIV p. 52
WOOD, J. C. Jan. 1910
Some Winter Birds of the Season 1908-9 in Wayne Co., Mich. Auk XXVII no. 1 p. 39
WOOD, NORMAN A.; SMITH, FRANK, & GATES, FRANK C. May 15, 1916
The Summer Birds of the Douglas Lake Region Cheboygan Co., Mich. Occ. Papers, Mus. of Zoöl. Univ. of Mich. no. 27 p. 14
WOODRUFF, E. S. 1907
Some Interesting Records from Southern Missouri. Auk XXIV p. 349
WOODRUFF, E. S. 1908
A Preliminary List of the Birds of Shannon and Carter Co., Missouri. Auk XXV p. 202
WORTHINGTON, W. W. Aug. 1881
Notes from Shelter Island. Orn. and Ool. Vol. 6 no. 6 p. 46
WRIGHT, H. W. Oct. 1909
Nesting of the Blue-winged Warbler. Auk XXVI no. 4 p. 341
WRIGHT, M. O. 1900
Birdcraft p. 16
YOUNG, C. G. 1925
Notes on Nests and Eggs of Some British Guiana Birds. Ibis p. 474
YOUNG, C. J. April 1898
The Philadelphia Vireo Auk XV p. 191
——— April 1904
Auk XXI no. 2 p. 283

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